THE *Nursing School*

COMPLETE BUNDLE

RNEXPLAINED INC.

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FUNDAMENTALS OF NURSING BUNDLE

COMMON MEDICAL ABBREVIATIONS CHEAT SHEET

A

AC – antecubital (L/R)
a.c. – before meals → "A" before "C" so before meals
ADL's – activities of daily living → basic activities we perform every day to live independently
aeb – as evidenced by → used in writing nursing diagnosis
AFIB – atrial fibrillation → heart rhythm
AMA – against medical advice
AMS – altered mental status

B

b.i.d. – twice a day → "Bi" means two so I think twice
BM – bowel movement
BP – blood pressure
BPH – benign prostatic hyperplasia
BPM – beats per minutes

C

CABG – coronary artery bypass graft → pronounced "cabbage"
CBC – complete blood count
CC – chief complain
CHF – congestive heart failure
CKD – chronic kidney disease
CNS – central nervous system
CO – cardiac output
c/o – complains of
COPD – chronic obstructive pulmonary disorder
CP – chest pain
CSF – cerebrospinal fluid
c/s – cesarean section
CTA – clear to auscultation
CVA – cerebrovascular accident → stroke
CVAT – costovertebral angle tenderness
CXR – chest x-ray

D

d/c – discharge/discontinue
DM – diabetes mellitus → NIDDM – non-insulin dependent diabetes mellitus (Type 2) & IDDM – insulin dependent diabetes mellitus (Type 1)
DNR – do not resuscitate
DOB – date of birth
DVT – deep vein thrombosis → blood clot
Dx – diagnosis

E

EC – enteric coated
EEG – electroencephalogram → evaluate electrical activity in the brain
EKG/ECG – electrocardiogram → evaluate electrical activity in the heart

F

FA – forearm
Fx – fracture → "x" like crossing out a bone or breaking it

G

GFR – glomerular filtration rate
GI – gastrointestinal
GSW – gunshot wound
GT – gastrostomy tube
gtt – drops (liquid measurement)
GTT – glucose tolerance test (oral)
GU – genitourinary

H

HA – headache
Hb – hemoglobin
HLD – hyperlipidemia
HPI – history of present illness
HR – heartrate
HS – bedtime → "hours of sleep"
HTN – hypertension
Hx – history

I

IBD – irritable bowel disease
IBS – irritable bowel syndrome
ICP – intracranial pressure
I&D – incision and drainage
ID – intradermal
IM – intramuscular
I&O – intake and output (urine)
IUP – intrauterine pregnancy
IV – intravenous
IVP – intravenous push

J

JVD – jugular vein distention

L

LBW – low birth weight
LE – lower extremity
LLL – left lower lobe
LLQ – left lower quadrant
LUL – left upper lobe
LV – left ventricle

M

MD – muscular dystrophy
MDD – maximum daily dose
MS – multiple sclerosis
MVA – motor vehicle accident

N

NKDA – no known drug allergies
NPO – nothing per os (by mouth)
NTG – nitroglycerine
N/V/D – nausea, vomiting, diarrhea
Ø – no/none

O

OCD – obsessive compulsive disorder
OCP – oral contraceptive
OD – right eye → we look right FIRST ("D" comes first)
OS – left eye → we look left SECOND ("S" comes second)
OSA – obstructive sleep apnea
OTC – over the counter
OT – occupational therapy
OU – both eyes → then we look both ways ("U" comes last)

P

p.c. – after meals → we play our PC video games after we eat our food
PCN – penicillin
PCP – primary care physician
PE – pulmonary embolism
PEEP – positive-end-expiratory pressure
PID – pelvic inflammatory disease
PMHx – past medical history
PMS – premenstrual syndrome
therapy
PNS – peripheral nervous system
PO – per os (by mouth)
PRN – as needed
PSHx – past surgical history
Pt – patient
PT – physical

Q

q – every
q2h – every two hours
q3h – every three hours
qd – once a day
qh – once every hour
qhs – at bedtime
q.i.d – 4x/day → "Q" for quad

R

RA – rheumatoid arthritis
RA – right atrium
RBBB – right bundle branch block
RBC – red blood cell
RF – risk factor
RLL – right lower lobe
RRR – regular rate and rhythm
r/t – related to → used in writing nursing diagnosis
RUL – right upper lobe
RV – right ventricle
Rx – prescription
RXN – reaction

S

SBO – small bowel obstruction
SOB – shortness of breath
s/s – signs and symptoms
STD – sexually transmitted disease
s/t – secondary to → "because of…"
Sx – symptoms

T

Tb – tuberculosis
TBI – traumatic brain injury
t.i.d – 3x/day → "T" for tri
Tx – treatment

U

UC – ulcerative colitis
UE – upper extremity
UO – urine output
URI – upper respiratory infection
UTI – urinary tract infection

V

VS – vital signs
VSS – vital signs stable

W

WBC – white blood cell
WNL – within normal limits
Wt – weight

LAB VALUES CHEAT SHEET

CBC

WBC: 4,000-11,000
RBC: 4.5-5.5
PLT: 150,000-450,000
Hgb: male: 13-18 g/dL
female: 12-16 g/dL
Hct: male: 42% - 52%
female: 37% - 47%

COAGS

PT: 10-13 seconds
INR: NOT on warfarin: < 1 sec
ON warfarin: 2-3 sec (if <2, ↑ dose)
PTT: 25-35 seconds
aPTT: 30-40 sec. (Heparin)

BMP

sodium: 135-145 mEq/L
potassium: 3.5-5.0 mEq/L
chloride: 95-105 mEq/L
BUN: 10-20 mg/dL
creatinine: male: 0.6-1.2 mg/dL
female: 0.5-1.1 mg/dL
glucose: 70-100 mg/dL (fasting)
calcium: 9-11 mg/dL
Albumin: 3.4-5.4 g/dL
Total protein: 6.2-8.2 g/L

LIPID PANEL

Total cholesterol: <200 mg/dL
Triglycerides: <150 mg/dL
LDL ("Loser"): <100 mg/dL
HDL: >60 mg/dL

indicator of ♥ disease

ABG'S

pH: 7.35-7.45
$PaCO_2$: 35-45
HCO_3: 22-26
PaO_2: 75-100 mmHg
O_2: 94-100%

ROME for pH/CO_2
Respiratory
Opposite
Metabolic
Equal

RENAL

calcium: 9-11 mg/dL
magnesium: 1.5-2.5 mg/dL
phosphate: 2.5-4.5 mg/dL

A1C

Nondiabetic: 4-6%
Prediabetic: 5.7-6.4%
Diabetic: >6.5%
↳ Target: <6.5%

LFT'S

ALT: 7-56 U/L
AST: 10-40 U/L
ALP: 40-120 U/L
Bili: < 1 mg/dL

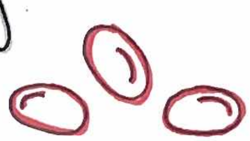
COMMON DRUGS

Digoxin: 0.5-2.0
Toxic: >2.5
carbamezapine (Tegretol): 4-10
Phenobarbitol: 15-40
Lithium: 0.5-1.2
Valproic acid (Depakote): 50-100
Dilantin: 10-20
Toxic: >20

OTHER

BMI Target: 18.5-24.9
I/O: >30 mL/hr Target: 50 mL/hr
CD4: 500-1200 cells, <200 = AIDS
MAP: 70-105 but at least 60 mmHg for adequate perfusion

LAB VALUE MEMORY TRICKS



COMPLETE BLOOD COUNT:

WBC's: 4,000 – 11,000 ⟶ "No immunosuppression from 4-11"

RBC's: 4.5 – 5.5 ⟶ "If RBC is 4.5–5.5, the tissues are alive"

PLATELETS: 150,000 – 450,000

HEMOGLOBIN: Male: 13-18, Female: 12-16 ⟶ Females mature quicker than men

HEMATOCRIT: Male: 42 – 52%, Female: 37 – 47% ⟶ Females that are 37-47yo date men that are 42-52yo

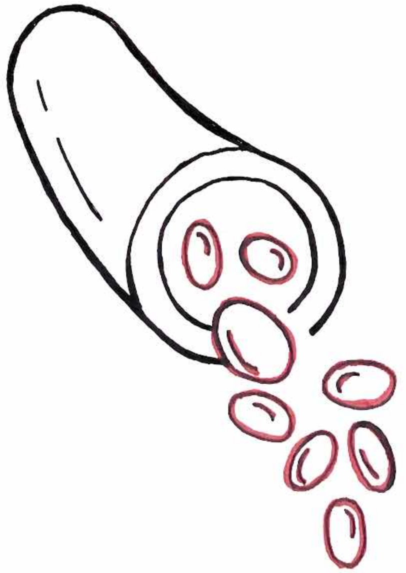
COAGS:

PT: 10 – 13 seconds ⟶ PreTeen = 10-13yo

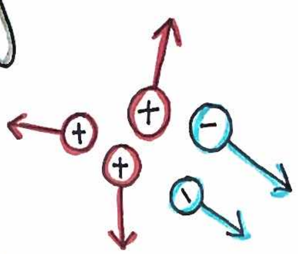
INR: ON WARFARIN: 2-3 seconds ⟶ "ON" = 2 letters, "WAR" = 3 letters

PTT: 25 – 35 seconds ⟶ PT-T looks like an H, so its used with Heparin

aPTT: 30 – 40 seconds ⟶ Proper Teaching Time = 30-40yo



LAB VALUE MEMORY TRICKS



BASIC METABOLIC PANEL:

SODIUM: 135-145 ⟶ " >145, your mouth is **DRY**"

POTASSIUM: 3.5-5.0 ⟶ You buy **3-5 bananas** in a bunch

CALCIUM: 9-11 ⟶ Call **9-1-1**

MAGNESIUM: 1.5-2.5 ⟶ Magnifying glass will **magnify** by **1.5-2.5x**

PHOSPHORUS: 2.5-4.5 ⟶ **"PHOR" = 4 letters**, **"US" = 2 letters** > Remember the **0.5**

CHLORIDE: 95-105 ⟶ **Chlorine pool**. Best time to go in when its **95-105°** outside

GLUCOSE: 70-100 ⟶ **SUGAR** = I can eat **70-100** M&M's

BUN: 10-20 ⟶ Hamburger **Buns**

CREATININE: Male: 0.6-1.2, Female: 0.5-1.1 ⟶ "**Creatinine** (waste product) will pass **through** (kidneys), if you're between **0.6-1.2**"

ADULT CPR

INITIAL STEPS

1. Scan the environment for safety
2. Check for response:
   ADULT – "Are you okay?"
   CHILD (1–Puberty) – "Are you okay?"
3. Call for help
   - Delegate someone else to call 911
   - Delegate someone else to get AED
   - In hospital – initiate rapid response
4. Assess breathing
   - Remove clothes if possible
   - For ALL ages: unresponsive, no breathing, gasping → not normal
   - No more than 10 SECOND assessment
5. Assess pulse
   - Adult: CAROTID
   - No more than 10 SECOND assessment

INITIATE CHEST COMPRESSIONS

- Adult's spine is supported on a firm surface
- Rate: 100 – 120 compressions/minute
- Cycle: 30:2 → 30 compressions; 2 breaths; repeat FIVE cycles
- Minimize compression interruptions to <10 seconds → when assessing for pulse in between cycles
- Attach and use AED as soon as possible → resume compressions immediately after each shock
- Breaths: head-tilt/chin lift position
  - Observe rise in chest when initiating a breath → that's how you know how forceful you should be

Adults: heels of hands on top of one another; lower half of the sternum

- Depth: 2 – 2.4 inches *or* 5 – 6 centimeters
- THINK: We have **two** hands and **five** fingers
- Breaths: pinch the nose shut and use your mouth to cover the adults mouth

AED TIPS

- Placement: one pad on the upper right chest and one on the lower left chest (midclavicularly)
  - THINK: "high right/low left"
- KEY: Adult pads can be used on a child 1–8 years old → placement may be different (see pediatric CPR sheet)
- Patient's chest should be bare and free from moisture or excessive hair that may alter effectiveness of the shock
- Clear the patient and deliver shock if advised by the AED machine
- After shock: resume compressions, assess breathing and pulse

CHEST TUBES

GOAL

Relieve the pressure from the pleural space (pneumothorax, hemothorax) *or* mediastinum space (after cardiac surgery) to improve respiratory/cardiac conditions

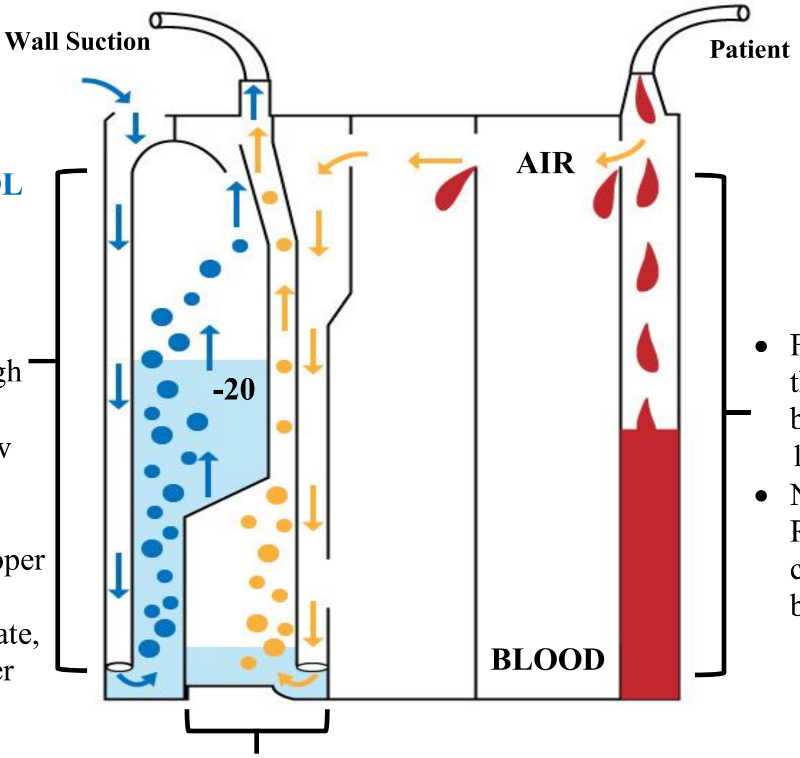
- Removal of air or fluid (blood)
- Allow the lung to re-expand *or* allow appropriate compression of the heart after surgery

NURSING CONSIDERATIONS

- Keep the drainage system *below* the insertion site
- Tubing must be free of kinks → Do NOT clamp or milk the chest tube
- Monitor for lung sounds, respiratory rate, dyspnea
- Assess for subcutaneous emphysema (crackling found on palpation of the skin)
- Encourage frequent moving, coughing, and deep breathing to facilitate movement of fluid

DISLODGED? Cover insertion site on 3 SIDES! Notify MD

SYSTEM BREAK? Insert tubing in 1in sterile water!



SUCTION CONTROL CHAMBER

Controls the amount of suction imposed on the patient

- High water level → High suction
- Low water level → Low suction
- Continuous bubbling is OKAY → Indicates proper suction

NOTE: Water will evaporate, so we must check the water level and refill if too low (appx. 20cm for adults)

COLLECTION CHAMBER

- Fluids that flow out of the patient → Should be NO more than 100mL (cc)/hr
- Note the color → Report excessively cloudy or unexpected bloody fluid

WATER SEAL CHAMBER

Allows air to be removed from the tube while preventing *outside* air from entering the lungs

**Connected to the collection chamber and allows air to pass down through a narrow channel and bubble out through the bottom of the water seal

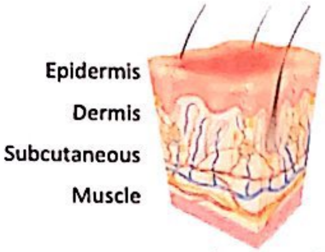
- The water seal chamber will intermittently fluctuate as the patient breathes in and out
  - Inspiration → Increase; Expiration → Decrease
  - Tidaling with breathing is *OKAY* → Indicates breathing
  - Continuous bubbling is *NOT OKAY* → Indicates an air leak somewhere in the system
- No fluctuation? → Indicates the lung has re-expanded (YAY) *or* there is a kink in the system
- GREAT indicator of how the patient is progressing
  - The underwater system acts as a measuring tool for measuring intrathoracic pressure. When intrathoracic pressure changes, fluctuation in the water level are observed.

BURNS

TYPES OF BURNS:

THERMAL: liquid, steam, fire
CHEMICAL: powder, gas (inhalation injury)
ELECTRIC: usually have an entry or exit wound
injuries may be internal

COLD: frostbite
RADIATION: sun, radiation
FRICTION: road rash



Superficial
(First degree burn)

- NO blisters or scars
- PINK or red
- may be tender or painful
- only affect top layer (epidermis)

Partial Thickness
(Second degree burn)

- raw, mottled, red appearance
- skin is **moist**
- may **blister** or need grafting
- painful, **blanching**
- shiny, scars left behind
- **2-6 wks healing time**

Full Thickness
(Third degree burn)

- black, brown, yellow, pearly white
- eschar, dry looking = **LEATHERY**
- blood vessels + bones may be visible
- **little to no pain** → nerves are **destroyed**
- may need grafting
- eschar **must** be removed

BURN LOCATION:

1. **Respiratory problems**: face, mouth, neck, torso
2. **Trouble healing**: ears, nose → poor blood supply
   ↑ RISK infection
3. **compartment syndrome**: full thickness, circumferential burn on extremities + torso
4. **Disability**: eyes, hands, feet
5. **Infection** - perineum, booty, ↑ burn surface area

INHALATION INJURY:

Watch For: burn on face or mouth
- burn in enclosed structure
- Hair singing
- sooty nose + mouth
- bright RED lips
- trouble talking
- confusion, anxiety

NURSING CARE: INFECTION CONTROL

1. **PPE** - gloves, gown, mask, cover hair
2. Ensure pt **Tetanus** shot if **>5-10 yrs**
3. Watch for **Temp. Loss** = shivering
   keep temp **85-100°F**
4. Pain control - **IV Route BEST**
   NOT oral - GI system is messed up
5. Wound care - **PREMEDICATE**
   debridement - remove necrotic tissue
   - **no pillows** for the ear or neck
     use rolled towel under shoulder
   - Watch for **webbing**

BURN CARE

EMERGENT PHASE:

- Onset of injury to 48hours
- RISK for burn shock – hypovolemic shock
  respiratory distress
  compartment syndrome

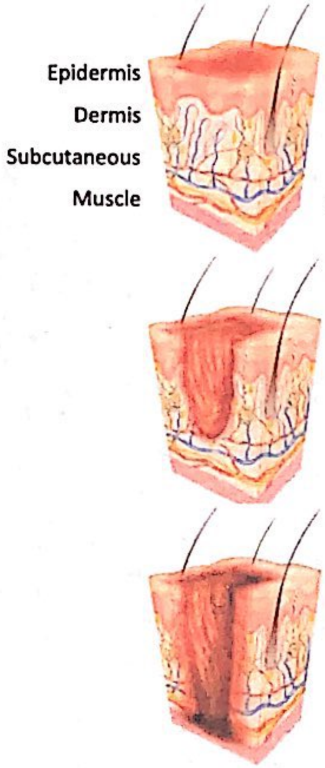
PATHO: ↑ capillary permeability, causing:
- plasma to leave
- sodium follows + albumin follows
- enters interstitial tissue

— EDEMA —

intravascular space becomes concentrated
- THICK blood!
- ↑ HCT, ↑K+, ↓wbc ⇒ ↓fluid = ↑HR, ↓CO, ↓BP

Risk Hypovolemic shock
- at least 2 IV access, central line
- immediate Fluids!!! – Lactated Ringers
- monitor UOP to titrate fluids

KEY: elevate extremities to ↑ fluid to ❤



Superficial (First degree burn)

Partial Thickness (Second degree burn)

Full Thickness (Third degree burn)

ACUTE PHASE

- from stabilization of permeability to wound closure
- Renal → diuresis is critical
  may need Foley → watch UOP
- Respiratory → potential intubation for inhalation injury
  watch ABG's
- GI → ↓ perfusion to cells in stomach, ↑ acid production (stress)
  - RISK for ulcers
  - RISK for ileus → ↓ function + motility
    Monitor bowel sounds, emesis
  - may need NG Tube or NPO
  - when bowel sounds return → HIGH calories, proteins + carbs!!
    watch for hyperglycemia

Σ GOAL: Prevent infection, alleviate pain, proper nutrition, wound care

REHABILITATIVE PHASE:

- from wound closure to return to pt's optimal level
- prevention of scars and contractures
  ↘ Encourage ROM and splints
- psychosocial tx
- Encourage ADL's
- PT, OT, cosmetic consults

RULE OF 9'S AND THE PARKLAND BURN FORMULA

WHAT'S THE SIGNIFICANCE?

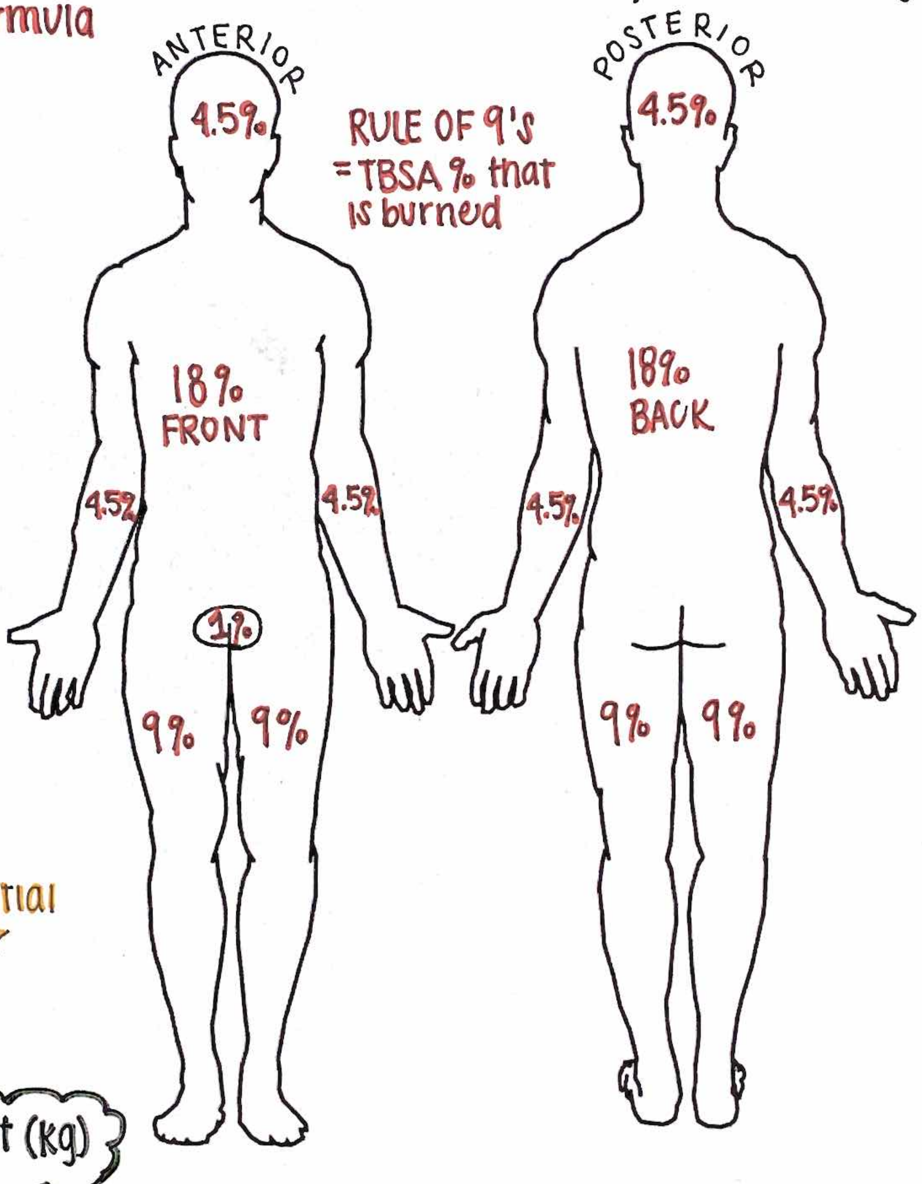
The Rule of 9's will help determine if the pt qualifies for referral or transfer to the BURN UNIT

› This also helps determine the amount of fluid therapy needed using the Parkland Burn Formula

RISK FOR:

HYPOVOLEMIC SHOCK w/in first 24 hours!!

Think: Burns will ↑ capillary permeability = fluid leaves the intravascular system into the tissues = organs suffer!



RULE OF 9'S = TBSA % that is burned

ONCE we establish the total body surface area % burned, we then use the Parkland Burn Formula:

› Will tell us how much fluid replacement the pt needs in the first 24hrs

› Typically used for partial thickness burns or higher

› Most common fluid: LACTATED RINGERS

4mL x TBSA% x Weight (kg)

⇩

GIVE: 1/2 volume in the 1st 8 hours
1/2 volume in the 2nd 16 hours

ISOLATION PRECAUTION CHEAT SHEET

STANDARD: HANDWASH ALL THE TIME!!

CONTACT ("DORMS")

Diarrheal → C.Diff, Rotavirus, Diarrhea, E.coli

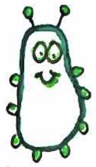
Other → conjunctivitis, salmonella

Respiratory infections → RSV (mask if productive cough), Adenovirus, Parainfluenza

Multi-drug resistant → MRSA, VRE

Skin and wound infections → scabies, lice, herpes simplex
›varicella (crusted lesions), shingles (localized)

PPE: Gown/gloves
›cover infected area when pt leaves room
›PRIVATE ROOM



DROPLET ("SPIDERMAN")

S - sepsis, streptococcal pharyngitis
P - pneumonia, pertussis
I - influenza A+B
D - Diptheria
E - epiglottitis
R - rubella
M - mumps, meningitis, meningeal pneumonia
A - adenovirus
N - nisseria meningitidis

COUGH + SNEEZE (3FT AWAY)

PPE: Mask
IF **risk** of body fluid contamination, wear
›Gloves
›Gown
›Goggles
KEY: Pt wears mask outside of room
PRIVATE ROOM

AIRBORNE ("AIRs MTV)

AIR**S** = shingles (herpes zoster)
*disseminated disease or immunocompromised

Measles (Rubeola)
Tuberculosis
Varicella (chicken pox)
*UNCRUSTED LESIONS

FLOATS IN AIR

PPE: N-95 mask
IF **risk** of body fluid contam. wear: › Gown
› Gloves
› Goggles
KEY: Pt wears mask outside room
ISOLATION NEGATIVE PRESSURE ROOM

PERSONAL PROTECTIVE EQUIPTMENT

DONNING

DON PPE: FROM THE BOTTOM UP

1. GOWN
2. MASK
3. GOGGLES
4. GLOVES

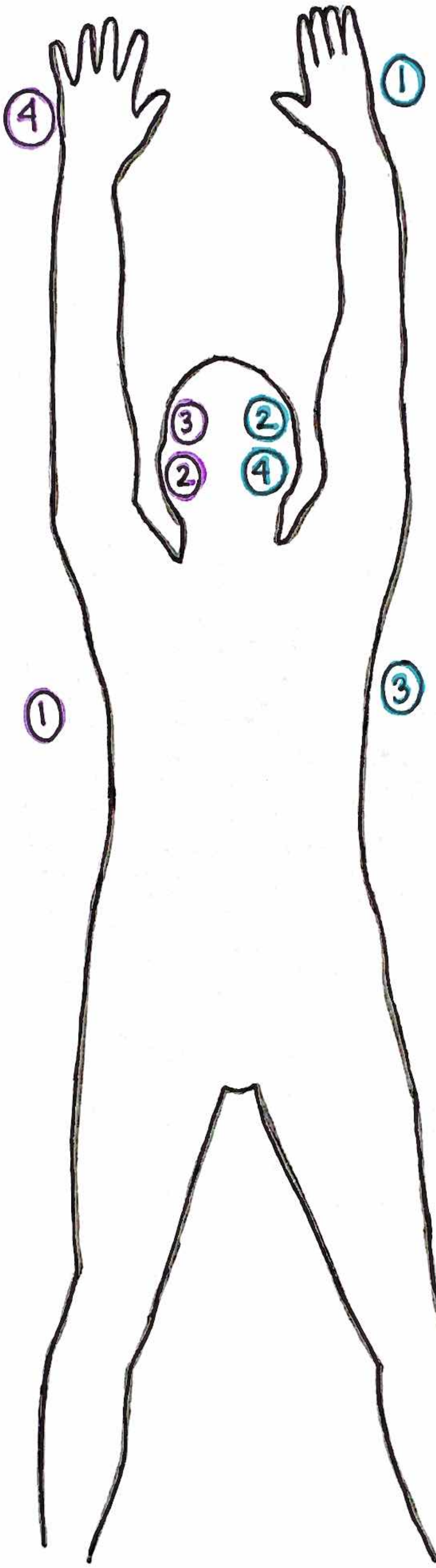
WASH HANDS BEFORE

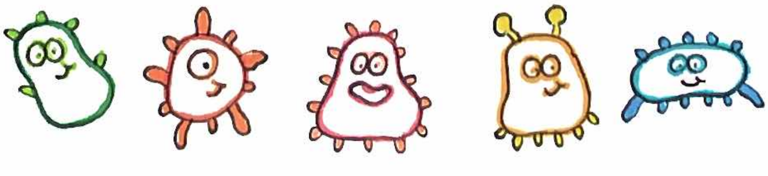
DOFFING

DOFF PPE: IN ALPHABETICAL ORDER

1. GLOVES
2. GOGGLES
3. GOWN
4. MASK

WASH HANDS AFTER





SCOPE OF PRACTICE

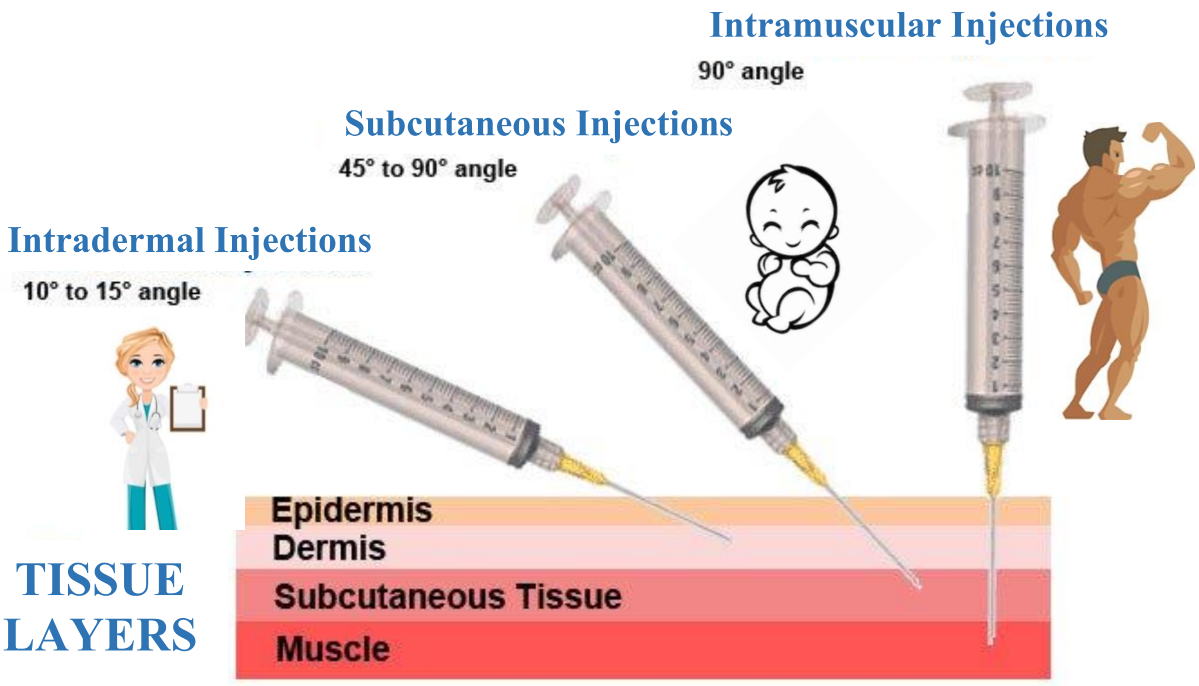
RN	› Clinical Assessment → ADPIE and TEACHING › Initial client education › Admission vitals/assessment › Discharge education › Clinical judgement › Initiating blood transfusion › IV's and IV medications › Post-op assessment + all LPN and UAP duties TEAMWORK
LPN	› Monitor RN Findings + Drainage and flow rate › Reinforce education › Administer MOST medications ✓ injections ✓ narcotics ✗ IV's/IV meds ✗ 1st IV bag › Routine procedures → catheter/in & out foley › Ostomy care! › Tube patency + enteral feeding/bolus › Lung/Bowel sounds → report to RN › Oral + nasal suctioning › Neuro checks
UAP	› Routine, stable vital signs › ADL's › Hygiene › Linen change › Document I&O's › Positioning/Transport (Transfer from bed to chair) › Vitals 1/2 hour after blood transfusion started › Feedings NOT with aspiration risk › Pick up blood from bank

NCLEX: Options asking to show, explain, monitor, teach, check, assess, demonstrate are NOT UAP SCOPE OF PRACTICE

Parenteral – administration of medication via injection to end up directly into bloodstream (BYPASS the GI tract)
Nonparenteral (Enteral) – administration of a medication directly into the GI tract (Ex: Oral for nOnparenteral)

Route	Injection Site	Length	Angle	Gauge
Intradermal	Forearm (most common) Upper back (allergy) Upper chest	Length: ¼ to ½	10 – 15°	25-27 gauge
Subcutaneous	1. Upper outer arm 2. Abdomen (except 2in around the navel) 3. Upper hip (love handles and buttocks) 4. Front and inner thigh	Length: ½ – 5/8 inch	45° If insulin pen: 90° *depends on how much fat you can grab*	23-25 gauge
Intramuscular	1. Arm (deltoid) 2. Thigh (vastus lateralis) → muscley men & children) 3. Butt (ventrogluteal and dorsogluteal)	Length: 1 – 1 ½ inches	90°	22-25 gauge

****Other Routes: Intravenous and Intraperitoneal**



HOW TO WRITE A NURSING DIAGNOSIS

KEY: Nurses *do not* diagnose medical problems!

- What nurses diagnose is the patient's *response* to a medical problem. We *must* think about how the patient IS CURRENTLY RESPONDING (actual) *or* WILL RESPOND (potential)

EXAMPLE: The healthcare provider diagnosis the patient with pneumonia. As the nurse, we must think about how the patient ***will respond to*** or ***is currently responding*** to having pneumonia.

What are some things that can go wrong with pneumonia?

- Difficulty breathing → NANDA: impaired airway (actual)
- Low O2 saturation → NANDA: ineffective gas exchange (actual)
- Pain → NANDA: Risk for pain (potential)
- Diarrhea → NANDA: Risk for diarrhea (antibiotics/potential)

3 PARTS TO A NURSING DIAGNOSIS:

1. NANDA Diagnosis: taking laymen's terms and "nursify it" using a NANDA diagnosis book
2. "Related to…" will always be related to the medical problem. This can be the medical diagnosis *or* write the medical diagnosis in your own words if your school doesn't allow this
3. "As evidenced by…" will give evidence to support the problem the patient is having aka your assessment findings

CONTINUING EXAMPLE:

1 2

Ineffective gas exchange RELATED TO pneumonia AS EVIDENCED BY oxygen saturation <90%, use of nasal cannula and visible mouth breathing.

3

ACTUAL vs POTENTIAL DIAGNOSES

ACTUAL

Example: The patient has just returned from major reconstructive surgery and is experiencing pain.

3 PARTS:

1. NANDA Diagnosis for pain → “Acute pain”
2. “Related to…” → Medical problem: Reconstructive surgery
3. “As evidenced by…” → Our assessment: 7 out of 10 pain and facial grimacing

CONTINUING EXAMPLE:

1 2

Acute pain RELATED TO reconstructive surgery AS EVIDENCED BY patient report of pain 7/10 and visible facial grimacing.

3

POTENTIAL

Goal: Catch problems *before* they go bad!

Typically, we use 3 steps to write a nursing diagnosis. However, potential diagnoses are SHORTER. Why? There are no signs and symptoms for something that hasn’t happened yet!

Example: The patient has not returned from major reconstructive surgery yet → You can still anticipate problems!

2 PARTS:

1. NANDA Diagnosis → Risk for infection
2. What makes the patient “at risk” for this problem?
   a. Medical problem → “Related to…” reconstructive surgery
   b. Observations we know may lead to infection → as evidenced by presence of invasive procedure

CONTINUING EXAMPLE:

1 2

1. Risk for infection RELATED TO reconstructive surgery

1 2

2. Risk for infection AS EVIDENCED BY presence of invasive procedure

Head-to-Toe Assessment Survival Guide

Hi there! I have created a head-to-toe assessment guide to help break down how to perform a head-to-toe assessment in the most simplistic way possible. I understand just how intimidating this may be for some of you, so let me help you!

To take it one step further, I included charting examples for *every* single body system to help you understand how to chart what you just assessed. Of course, many schools will have their own version of a head-to-toe assessment, and some of the tests/charting examples included in my guide will slightly vary. However, I am confident this will be a "saving grace" for your next assessment. Happy studying!

Sincerely,
RNExplained

Key:
Use the **same** assessment process for every body system. Start with inspection by simply observing the body system you're looking at. Then move to percussion, palpation and auscultation. This will make it way easier to organize your assessment.

- The abdomen is the *only* body system that requires auscultation *before* percussing or palpating
- Gloves may or may not be worn for these assessments; may vary by school
- *Always* perform hand hygiene and ask for permission to touch the patient

Detailed Head-to-Toe Health Assessment

Use this detailed chart to guide your head-to-toe assessment. This will include thorough information regarding each body system and their respective tests. You will find normal ranges, grading scales, indications for abnormal results, etc. that will enable you to understand *exactly* what you are assessing for.

Vital Signs

Heart Rate

- Bradycardia: <60bpm
- Normal: 60 – 100bpm
- Tachycardia: >100bpm

Blood Pressure

- Hypotensive: <90mmHg systolic *or* <60mmHg diastolic
- Normal: 120/80
- Hypertensive: >130mmHg systolic *or* >80mmHg diastolic

Respiratory Rate

- Bradypnea: <12 breaths/min
- Normal: 12 – 20 breaths/min
- Tachypnea: >20 breaths/min

Temperature

- Hypothermic: <35°C
- Normal: 36.5 C – 37.5° C
- Fever/Hyperthermic: >38° C

Pulse Oximetry

- Severe hypoxemia: <85%
- Hypoxemia: 85 – 94%
- Normal – Healthy: 95 – 100%
- Normal – COPD: 88 – 92%

Pain: Are you experiencing any pain? If so, use PQRST?

  - **P**: provoking/relieving factors; **Q**: quality; **R**: radiation; **S**: severity; **T**: time/onset

Mental Status Exam

AAOx4: Alert and oriented to person, place, time, and situation

Gait: Observe posture and body movements; tremors?

Emotional status: Calm, agitated, stressed, crying, happy, flat, drowsy

Hygiene: Well-groomed, poorly-groomed, abnormal smells

Speech: Clear or slurred

Glasgow Coma Scale

- Severe: 3 – 8
- Moderate: 9 – 12
- Mild (best): 13 – 15

Coordination:

- Finger-to-Nose: Ask the patient to look straight ahead while alternating finger to nose
- Finger-to-Finger: Ask the patient to look straight ahead while touching their finger from their nose to your finger

HEENT – Head, Ears, Eyes, Nose, Throat

Head

Inspect: Note the appearance of the face and head from a visual standpoint

Consistency, distribution, and color of hair

- Is there any alopecia noted?
- Is the hair evenly distributed along the scalp?
- Is color of hair consistent with age of patient?
- Are there any signs of lice or dandruff?
- Is the patient's hair well-groomed? Poorly-groomed?

Observe for symmetry on either side of the face and head

- Are there any lesions, masses, or skin breakdown noted on the head/scalp?
- Is there any drooping noted unilaterally?
    - If yes, this may be indicative of Bell's Palsy or recent stroke
- Are facial expressions symmetrical?
    - **CRANIAL NERVE VII (7):** Ask the patient to close their eyes tightly, smile, frown, puff out cheeks

Palpate: Feel the patient's scalp

Symmetry on either side of the scalp and head

- Are there any palpable lesions or masses noted on the head/scalp?

Temporal artery

- Is the temporal artery equal in strength on both sides?
    - Normal: Equal pulsation, elastic, and nontender
    - Abnormal: Unequal *or* decreased pulsation, tender

Temporomandibular joint

- Ask the patient to open and close the mouth to assess for grating or clicking

Facial sensation

CRANIAL NERVE V (5):

- Run the fingers on either side of the face to assess for equal facial sensation
- Ask the patient to bite down to assess the masseter and temporal muscle

Ears

Inspect: Note the appearance of the ears from a visual standpoint

Symmetry of bilateral ears in relationship to the eyes

- Are bilateral ears symmetrical? Even with eye level?
    - Low-set ears may indicate a chromosome abnormality (Down Syndrome)

Color and drainage from bilateral ears

- Is there any inflammation or erythema noted on either ear?
- Is there any visible drainage coming from either ear?

Hearing tests

- CRANIAL NERVE VIII (8):
    - **Whisper test →** With one ear covered, whisper a word in the patient's uncovered ear and have the patient repeat it back to you. Repeat with the other ear.
- **Rinne test →** Place a tuning fork on the mastoid bone behind the ear. Ask the patient to tell you when they no longer hear the sound.
- **Weber test →** Move the fork to the base of the head and ask the patient to tell you if sound is heard equally in bilateral ears

Otoscope:

- Pull up and back for an adult or child >3 years old
- Pull down and back for a child <3 years old

Tympanic membrane: color and cone of light

- Is the color pearly grey and translucent in color?
    - If not, other colors (red, yellow, cloudy, discharge) may indicate infection or perforation
- Is the cone of light visible in the correct locations for each ear?
    - Right ear: 5 o'clock
    - Left ear: 7 o'clock

Palpate: Feel the patient's ear

- Observe for signs of pain or tenderness with palpation of the tragus, pinna, lobule
- Palpate the mastoid process for signs of radiating pain, tenderness, or swelling coming from the affected ear

Eyes

Inspect: Note the appearance of the eyes from a visual standpoint

Symmetry of bilateral eyes in relationship to the ears

- Are bilateral eyes symmetrical? Even with ear level?

External eye lids, pupils, sclera and conjunctiva

- Is there swelling or inflammation of the external eye (eyelids)?
- Is the conjunctiva pink in color?
    - Abnormal: Erythema will indicate some sort of irritation
- Is the upper eyelid appropriate color to ethnicity?
    - Abnormal: Erythema will indicate some sort of irritation
- Are the pupils clear and appropriate size?
    - Constricted: 2 – 3mm in diameter
    - Normal: Pupils should be clear and 3 – 5mm in diameter
    - Dilated: 5 – 8mm in diameter
- Is the sclera white and shiny?
    - Abnormal: Yellow color → jaundice

Strabismus

- Do bilateral eyes line up with one another when looking at an object?
    - Positive strabismus: Loss of depth perception
    - Negative strabismus: Normal

Nystagmus: Involuntary movements of the eyes

CRANIAL NERVES III (3), IV (4), VI (6):

- Have the patient follow a penlight with their eyes *only* in the six cardinal fields of gaze (up, down, left, right, diagonal)

PERRLA:

1. Turn the lights off and assess pupil reaction to penlight in bilateral eyes
    a. Normal: Pupils are equal, round and reactive (will constrict) to light
2. Turn the lights back on and focus the eyes on the penlight at a far distance. Slowly bring the pen light closer to the patient's nose to assess for *accommodation*.
    a. Watch for equal constriction and movement of bilateral eyes to cross (patient should look cross eyed)

CRANIAL NERVE II (2): Visual Acuity → Snellen Chart

Nose

Inspect: Note the appearance of the nose from a visual standpoint

Symmetry of the external nose

- Does the nose appear midline?
- Are there any visible masses or lesions on the external nose?

Color and rhinorrhea (drainage)

- Is the nose appropriate color to the rest of face?
    - If not, erythema may indicate irritation, allergy, cold
- Is there visible discharge coming from either naris? What color? Consistency?
    - Ask the patient if they experience any discharge (rhinorrhea)

Internal nares

- Use a penlight to assess for erythema, lesions or polyps noted in bilateral internal nares
- Does the septum appear deviated? Is it obstructing airflow?

Patency

- Ask the patient to close one nostril and breathe through the nose. Repeat on the other side.

Smell test

CRANIAL NERVE I (1):

- Have the patient close their eyes and place a fragrant smell under their nose (peppermint, cinnamon, etc.). Then, ask the patient to identify the smell

Palpate/Percuss: Feel the patient's sinuses

- Using both thumbs, press down on the patient's bilateral frontal and maxillary sinuses to assess for pain or tenderness
- Repeat with percussion

Throat (Mouth)

Inspect: Note the appearance of the lips and mouth from a visual standpoint

Symmetry of the lips

Color and appearance of external lips

- Are the lips pink in color?
  - Abnormal: Blue/dusky → cyanotic
- Are the lips moist?
  - Abnormal: Cracked or dry appearing → dehydrated
- Are there lesions present on or around the lips?
  - Take note of any active herpetic crusts/lesions

Dentition

- Does the patient have a full set of teeth? Missing teeth?
  - Normal adult: 32 teeth
  - Normal child: May be missing teeth
  - Abnormal: Adult missing teeth
- Do the teeth seem to be well-kept?
  - Normal: Teeth should be white/slightly yellow
  - Abnormal: Black
  - Note any crowns or cavities
- Do the gums appear to be pink and moist?
  - Abnormal: Beefy red, bleeding, cracked, dry, or inflamed

Tongue

- Does the tongue appear to be pink and moist? Oral thrush? Frenulum?
  - Abnormal: Beefy red, cracked, dry, or swollen, white film (thrush)
- Are there any lesions noted on the tongue?
- **CRANIAL NERVE XII (12):**
  - Ask the patient to stick the tongue out and move from side to side

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Hard and soft palate, tonsils, and uvula

- Is the mucosa pink with a smooth soft palate and a rigid hard palate?
  - Abnormal: Cleft palate, ulcers
- Is the uvula midline?
- Is there exudate present on bilateral tonsils?
  - What grade are the tonsils?
  - 0 = removed, 1 = barely visible, 2 = baseline (normal), 3 = moderately swollen, 4 = touching each other (kissing)
- **CRANIAL NERVE IX (9):**
  - Place a tongue depressor on the back of the tongue and ask the patient to say “Ah.” The uvula should rise upwards.
- **CRANIAL NERVE X (10):**
  - Ask the patient to talk and swallow with ease

Neck

Inspect: Note the appearance of the neck from a visual standpoint

Symmetry of the neck

- Does the trachea appear midline?
- Are there any visible lumps (goiter), lesions, or enlarged lymph nodes?

Range of motion

CRANIAL NERVE XI (11):

- Ask the patient to turn the head from side to side, up and down

Jugular veins

- Place the patient in semi-Fowlers position and turn the head to one side. Then, assess if the jugular vein is visible?
    - Abnormal: Distended jugular vein may indicate a circulation problem

Palpate: Feel different parts of the patient's neck

Trachea

- Normal: Midline; no masses or swelling
- Abnormal: Deviation from midline → typically from pneumothorax or trauma

Carotid arteries – ONE at a time

- Grade: 0 – 4+
    - 0 = absent
    - 2+ = normal
    - 4+ = bounding

Thyroid gland

- Stand behind the patient with your hands placed in the area of the thyroid (under the Adam's apple). Then, ask the patient to swallow and assess for symmetry, tenderness, swelling, bulging etc.

Palpate the lymph nodes for swelling or tenderness

- Preauricular (in front of ears)
- Postauricular (back of ears)
- Occipital (further away from back of ears)
- Tonsillar (below the angle of the mandible)
- Submandibular (below cheek bones)
- Submental (under chin)
- Superficial cervical (below ears and back towards back of neck)
- Deep cervical chain (run fingers down the neck to the shoulders)
- Posterior cervical (behind sternomastoid and in front of trapezius)
- Supraclavicular (right above clavicle)

Auscultate: Use the bell of the stethoscope to listen for abnormal sounds

Carotid arteries – ONE at a time

- Is blood flow appropriate duration and intensity?
- Is there evidence of bruits? Is blood flow turbulent (whooshing)?

Respiratory and Cardiac

Inspect: Note the appearance of the anterior and posterior chest and respiratory effort from a visual standpoint

- Watch for respiratory effort and pattern when relaxed and talking
  - Is the patient using abdominal muscles or accessory muscles to breathe?
  - Is the patient sitting comfortably? Tripod position?
- Observe color of skin to evaluate perfusion status
- Observe for lesions, scars, external pacemaker, or subcutaneous port

Symmetry along the anterior and posterior chest

- Is the anterior chest symmetrical?
  - Abnormal: Barrel chest may indicate COPD
- Are there any masses or swelling noted along the anterior or posterior chest?

Percuss: Tap on the surface of the anterior and posterior chest to assess for resonance and vibration

Normal: Produces a low-pitched, resonant sound of high amplitude over normal gas-filled lungs.
Abnormal: Produces a dull, short note whenever fluid or solid tissue replaces air filled lung (pneumonia or mass) *or* when there is fluid in the pleural space

- *Or* produces a hyper resonant sound over hyperinflated lungs (e.g. COPD).
- *Or* produces a tympanic sound over no lung tissue (e.g. pneumothorax).

Costovertebral Angle Tenderness (CVAT)

1. Place one hand on the lower back at the costovertebral angle
2. Thump hand with fist

- Normal: No CVA tenderness upon percussion
- Abnormal: CVA Tenderness upon percussion → indicative of kidney infection

Palpate: Feel the posterior chest as well as the apical pulse

Lung expansion

- Place the hands on the back with thumbs pointed towards the spine.
  - Normal: The hands should lift symmetrically outward when the patient takes a deep breath
  - Abnormal: Asymmetric expansion may occur if air or fluid fill the pleural space

Tactile fremitus

- Place the ulnar surface of both hands against either side of the spine. Then, ask the patient to say the word "ninety-nine." Move hands down the spine to assess the entire posterior thorax.
  - Normal: Lung transmits a palpable vibratory sensation to the chest wall
  - Abnormal:
    - Lung consolidation – Lung becomes engorged with fluid (pneumonia) → fremitus is LOUDER
    - Pleural effusion – Fluid fills the pleural space between the lung and the chest wall → fremitus is SOFTER

Apical pulse

- Point of maximum impulse → located at the 5th intercostal space midclavicularly
- Normal: 60 – 100bpm

Auscultate: Use the diaphragm of the stethoscope to listen for heart and lung sounds individually

Heart

- 5 points:
  - **All**: Aortic
    - Where to place the stethoscope: Locate the sternal notch. Walk your fingers down until you find a distinct bony ridge. Move your finger to the right → that is your 2nd intercostal space.
    - You should hear a classic, loud "dub" sound
  - **Physicians**: Pulmonic
    - Where to place the stethoscope: Locate the sternal notch. Walk your fingers down until you find a distinct bony ridge. Move your finger to the left → that is your 2nd intercostal space.
    - You should hear a classic, loud "dub" sound
  - **Enjoy**: Erb's Point (halfway point between the base and the apex of the heart)
    - Where to place the stethoscope: From the pulmonic location, walk your fingers down one fingerbreadth → this is your 3rd intercostal space
    - This is the halfway point
  - **Taking**: Tricuspid
    - Where to place the stethoscope: From the Erb's Point location, walk your fingers down one fingerbreadth → this is your 4th intercostal space
    - You should hear a classic "lub' sound
  - **Money**: Mitral
    - Where to place the stethoscope: From the tricuspid location, walk your fingers down one fingerbreadth → this is your 5th intercostal space → move the fingers to the midclavicular line
    - You should hear a classic "lub' sound
    - This is also the Point of Maximum Impulse (Apical Pulse)

**Repeat the same steps with the bell of the stethoscope to auscultate for abnormal sounds: murmurs, bruits, thrills, etc.

Lungs

Anterior:

- 8 – 10 points *depending on school*

1. Start at the apex of the lungs (above the clavicle)

Move in zig-zag fashion to the 2nd, 4th, and 6th intercostal spaces

Posterior:

- 8 – 10 points *depending on school*

1. Start at the apex of the lungs (above the scapula)

Move in a zig-zag fashion downwards and slightly midline to avoid the scapula

Abdomen

Inspect: Note the appearance of the abdomen from a visual standpoint

Ask the patient: last BM? Difficulty with urination? LMP?
Ask the patient to lie supine
Stomach contour

- Is the stomach round and symmetrical?
    - Abnormal: Distended *or* asymmetrical
- Is the skin color appropriate for ethnicity? Striae?
    - Abnormal: Erythematous
- Are there any masses noted? Lesions? PEG tubes?
- Are there visible aortic pulsations? (located above the umbilicus and visible in thin patients)
- Is there an ostomy present?
    - If so, note the color and presence of drainage

Auscultate: Use the diaphragm of the stethoscope to listen for bowel sounds

Begin in the **right lower quadrant** and work clockwise in all four quadrants

- 1 minute/quadrant → Normal: 5 – 30 sounds per minute
- Are bowel sounds normal, hyperactive, hypoactive?
    - If no bowel sounds, listen for 5 minutes/quadrant

Use the *bell* of the stethoscope to listen for bruits
Location:

- Aorta: Place the stethoscope midline between the xiphoid process and the umbilicus
- Renal arteries: Place the stethoscope slightly lower from the aortic site, to the right and left
- Iliac arteries: Place the stethoscope slightly lower from the umbilicus, to the right and left
- Femoral arteries: Place the stethoscope on the right and left groin

Percuss: Tap different parts of the patient's abdomen

Begin in the **right lower quadrant** and move upwards until the liver edge is found

- Normal: Percussion should elicit a hollow sound until the liver edge is found. The liver edge will sound dull (organs, fluid, bones = dull sound)

Palpate: Feel different parts of the patient's abdomen

Begin in the **right lower quadrant** and work clockwise in all four quadrants

- Light palpation (2cm)
    - Is there any pain? Rigidity?
- Deep palpation (4 – 5cm)
    - Are there any masses or lumps noted? Rebound tenderness?

Musculoskeletal

Inspect: Note the appearance of the spine from a visual standpoint

Ask the patient bend over to touch the toes to observe for spinal curvature and check for scoliosis
Romberg test – ask the patient to stay standing with the eyes closed to assess for loss of balance

- Normal: No loss of balance = Negative Romberg test
- Abnormal: Loss of balance = Positive Romberg test

Upper Extremities

Inspect: Note the appearance of the arms, hands, and fingers from a visual standpoint

Color, contour, and deformity

- Is the skin color appropriate for ethnicity? Erythematous? Edematous? Any lesions or rashes? IV's? PICC lines?
  - If any IV's or PICC lines, assess for any drainage, erythema, bleeding, infiltration
- Do the fingers have any obvious deformities?
  - Indicative of osteoarthritis

CRANIAL NERVE XI (11):

- Ask the patient to shrug the shoulders with resistance
- Ask the patient to turn the head against resistance

Palpate: Feel different parts of the patient's upper extremities

Capillary refill

- Press down on the nailbeds
  - Normal: Less than 2 seconds

Skin tenting

- Pull up on the skin to assess skin turgor
  - Normal: Skin will return flat onto the skin in a few seconds
  - Abnormal: Skin will remain "tented" → dehydration

Skin temperature

- Assess for any warmth in the presence of erythema → potential infection

Range of motion

1. Ask the patient to bend the arms, elbows, wrists, and fingers
2. Repeat with rotation of arms, elbows, wrists and fingers

- Note any decreased range of motion in the joints

Muscle strength

1. Ask the patient to squeeze your fingers as hard as they can
2. Ask the patient to push up against your hands as you provide resistance
3. Ask the patient to pull away from your hands as you provide resistance
   - Grade: 0 – 5+ strength
     - 0/5 = Complete paralysis
     - 1/5 = Flicker of contraction
     - 2/5 = Movement of possible is resistance of gravity is removed

    - 3/5 = Movement against gravity is possible but not against nurse’s resistance
    - 4/5 = Movement against gravity and light resistance
    - 5/5 = Normal strength

Pulses

- Palpate brachial pulses bilaterally
- Palpate radial pulses bilaterally
  - Grade: 0 – 4+
    - 0+ = No palpable pulse
    - 1+ = Faint
    - 2+ = Diminished
    - 3+ = Normal
    - 4+ = Bounding

Sensation

Test sensation (sharp and dull) in 3 locations along the upper extremities

- Grade 0 – 2
  - 0 = Absent sensation
  - 1 = Impaired sensation
  - 2 = Normal sensation

Lower Extremities

Inspect: Note the appearance of the thighs, calves, ankles, feet and toes from a visual standpoint

Color, contour, and deformity

- Is the skin color appropriate for ethnicity? Any lesions or rashes?
  - Abnormal: Erythematous *or* edematous
- Is hair evenly distributed?
  - Abnormal: Loss of hair and shiny skin may indicate peripheral vascular disease (PVD)
- Are the calves erythematous or edematous?
  - Abnormal: Visible edema may indicate DVT
- Is there any visible fungus on the toenails?
- Are there sores on the plantar surface of the feet?
  - Key: Diabetics lose sensation on the feet, so they may not be aware of foot damage
- Do the feet/toes have any obvious deformities?
  - Indicative of gout

Palpate: Feel different parts of the patient’s lower extremities

Capillary refill

- Press down on the nailbeds
- Normal: Less than 2 seconds

Skin pitting

- Press down on the skin of the calves to assess for pitting edema
  - Normal: Skin will return flat onto the skin in a few seconds
  - Abnormal: Skin will remain “pitting” → patient is retaining fluid

Skin temperature

- Assess for any warmth in the presence of erythema → potential infection
  - Abnormal: Cool/clammy/dry/cold flushed

Range of motion

1. Ask the patient to bend the hips, knees, ankles, and toes
2. Repeat with rotation of hips, knees, ankles and toes

- Note any decreased range of motion in the joints

Muscle strength

1. Ask the patient to push up with the top of the foot against your hands as you provide resistance
2. Ask the patient to push down with the bottom of the foot (like a gas pedal) against your hands as you provide resistance
3. Repeat these same tests with the front and back of the calves
    - Grade: 0 – 5+ strength
        - 0/5 = Complete paralysis
        - 1/5 = Flicker of contraction
        - 2/5 = Movement of possible is resistance of gravity is removed
        - 3/5 = Movement against gravity is possible but not against nurse's resistance
        - 4/5 = Movement against gravity and light resistance
        - 5/5 = Normal strength

Pulses

- Femoral pulses bilaterally
- Palpate popliteal pulses (behind the knee) bilaterally
- Palpate dorsalis pedis pulses (top of foot) bilaterally
- Palpate posterior tibial pulses (at the ankle) bilaterally
    - Grade: 0 – 4+
        - 0+ = No palpable pulse
        - 1+ = Faint
        - 2+ = Diminished
        - 3+ = Normal
        - 4+ = Bounding

Sensation

Test sensation (sharp and dull) in 3 locations along the lower extremities

- Grade 0 – 2
    - 0 = Absent sensation
    - 1 = Impaired sensation
    - 2 = Normal sensation

Babinski reflex: Stroke the bottom of the foot from heel to toe to note movement of the toes

- Normal: Curling of toes = negative Babinski
- Abnormal: Big toe bends back and toes fan out = positive Babinski

Shortened Head-to-Toe Health Assessment

Once you have mastered the detailed head-to-toe examination, and *truly* understand each test's purpose/findings, use this shortened version to do it on your own! Each body system will provide the specific tests to perform, but it's up to you to test *your* knowledge on what *you* know.

Hint: You know more than you think you do, so be confident!

Vital Signs

- Heart Rate
- Blood Pressure
- Respiratory Rate
- Temperature
- Pulse Oximetry
- Pain

Mental Status Exam

- AAOx4

Observe:

- Gait
- Emotional status
- Hygiene
- Speech
- Glasgow Coma Scale
- Coordination: Finger-to-nose; Finger-to-finger

HEENT

Head:

- Inspect:
  - Consistency, distribution of hair, color, symmetry of head & **CRANIAL NERVE VII (7)**
- Palpate:
  - Temporal artery, temporomandibular joint & **CRANIAL NERVE V (5)**

Ears:

- Inspect:
  - Symmetry (ears vs. eyes), drainage, **CRANIAL NERVE VIII (8)**
- Visualize tympanic membrane and cone of light
- Palpate:
  - Pain and tenderness of the tragus, pinna, lobule & mastoid process

Eyes

- Inspect:
  - External eye, strabismus, nystagmus, PERRLA & **CRANIAL NERVE II (2), III (3), IV (4), VI (6)**

Nose:

- Inspect:
  - Symmetry, drainage, internal nares, patency & **CRANIAL NERVE I (1)**
- Palpate/Percuss:

- Frontal and maxillary sinuses

Throat:

- Inspect:
  - Lips: symmetry, color, appearance
  - Dentition, gums
  - Tongue; **CRANIAL NERVE XII (12)**
  - Hard and soft palate, uvula, tonsils, & **CRANIAL NERVE IX (9), CRANIAL NERVE X (10)**

Neck

Inspect

- Tracheal symmetry, jugular veins, **CRANIAL NERVE XI (11)**

Palpate

- Trachea, carotid arteries, thyroid gland, & lymph nodes (10 areas)

Auscultate

- Carotid arteries

Respiratory/Cardiac

Inspect

- Anterior and posterior chest for symmetry, masses, scars, respiratory effort

Percuss

- Resonance, vibration, & CVAT

Palpate

- Lung expansion, tactile fremitus, apical pulse

Auscultate

- Heart
  - Diaphragm – 5 points (**A**ll **P**hysicians **E**njoy **T**aking **M**oney)
  - Bell – Repeat for abnormal sounds
- Lungs
  - Start at the apex and move in a zig-zag fashion (avoid bones!)

Abdomen

Pain? Last BM?

Inspect

- Stomach contour, masses, lesions, ostomy/PEG tubes

Auscultate

- Diaphragm – Start in right lower quadrant and work clockwise in all four quadrants
- Bell – Listen for bruits in the aortic, renal arteries, iliac arteries, femoral arteries

Percuss

- Begin in a right lower quadrant and move upwards to locate the liver edge

Palpate – Light and deep

- Begin in the right lower quadrant and work in a clockwise fashion

Musculoskeletal

Inspect – spinal curvature & Romberg test

Upper Extremities:

Inspect

- Color, contour, deformity & **CRANIAL NERVE XI (11)**

Palpate

- Capillary refill, skin tenting, temperature, ROM, muscle strength, pulses (brachial and radial), & sensation

Lower Extremities:

Inspect

- Color, contour, deformity, hair loss, & edema

Palpate

- Capillary refill, skin pitting, temperature, ROM, muscle strength, pulses (femoral, popliteal, dorsalis pedis, posterior tibialis), sensation & Babinski reflex

Charting by Body System

This will provide examples on how to chart "normal" assessments for each body system. Use this as your point of reference to add or take out any assessment findings, as well as alter for abnormal findings.

Mental Status Exam

AAOx4. Steady gait. Negative Romberg test. Pt appears calm without apparent distress. Well groomed. Steady, smooth speech. GCS 15. Able to perform repetitive finger-to-nose and finger-to-finger test at a smooth pace. Cranial nerves I-XII intact.

Head

Head is symmetrical, round, hard, and smooth without lesions or bumps noted on palpation. Pt has brown hair, evenly distributed along the scalp without areas of alopecia. Well-groomed. Face is round, smooth, and symmetrical. No evidence of facial drooping. Temporal arteries are equal, elastic, and nontender. Temporomandibular joint palpated with full range of motion without tenderness.

Ears/Eyes

Bilateral ears are at appropriate level in relationship to bilateral eyes. Pt denies hx of pain or tenderness to bilateral ears. Pt denies hx of recent ear infection. Bilateral ears are smooth, no lumps, lesions, nodules noted. Appropriate color. No visible drainage noted. Nontender on palpation of the tragus or pinna. Pt denies radiating pain from bilateral ears. Small amount of yellow cerumen in external canal. Tympanic membrane is pearly grey and translucent. Able to visualize the cone of light. Able to perform Whisper test with ease.

Bilateral eyes are symmetrical without redness, discharge or crusting from external eyelids. Conjunctiva appears pink and smooth. Sclera appears white with no lesions or redness noted. Bilateral pupils are clear equal in diameter. PEERLA. Negative strabismus. Negative nystagmus.

Nose/Throat/Sinus

Nose is symmetrical and appropriate color. No signs of erythema or irritation. No visible masses or lesions noted on the external nose. Pt denies hx of recent rhinorrhea. Bilateral nares are patent. Cranial nerve I intact. No sign of septal deviation, lesions or polyps noted on bilateral internal nares. No purulent drainage noted. Frontal and maxillary sinuses are nontender to palpation and percussion.

Lips appear pink and moist without evidence of lesions. No swelling noted along the vermillion border. Pt has 32 intact teeth that are slightly yellow without evidence of cavities or crowns. Gums pink without redness or swelling. Tongue pink and moist without evidence of oral thrush. Cranial nerve XII intact. Frenulum midline. Soft palate smooth and pink. Uvula midline with bilateral tonsils 2+. No evidence of exudates on bilateral tonsils. Cranial nerve IX and X intact.

Neck

Neck symmetric with midline trachea and no bulging masses. C7 is visible and palpable with neck flexion. Cranial nerve XI intact. Pt has smooth, controlled, full range of motion of neck. No evidence of JVD. Bilateral carotid arteries 2+, elastic. No evidence of carotid bruits upon auscultation. Thyroid gland nonvisible but palpable when swallowing. Lymph nodes nonpalpable.

Respiratory

Respirations 16/minute, relaxed an even. Able to talk with ease. Anterior and posterior chest are symmetrical without evidence masses, lesions, or scars. Percussion tones resonant over bilateral lung fields. Nontender to palpation over the posterior chest wall. Chest expansion symmetric. No tactile fremitus noted. No CVAT. Vesicular lung sounds noted over bilateral lung fields upon auscultation. No adventitious breath sounds noted.

Cardiac

Bilateral carotid arteries 2+, elastic. No evidence of carotid bruits upon auscultation. No evidence of JVD. Apical pulse palpated at the 5th intercostal space, midclavicularly. Apical pulse 70bpm. RRR upon auscultation. S1 heard best at the apex. S2 heart best at the base. No evidence of splitting heart sounds.

Abdomen

Abdomen is round and symmetric with no bulges or masses noted. Skin color is appropriate to ethnicity without striae, scars or lesions noted. No visible aortic pulsations. Soft gurgles present in all four quadrants upon auscultation. Percussion reveals generalized tympany (hollow sound) in all four quadrants. No rebound tenderness or guarding noted with light and deep palpation over the generalized abdomen.

Musculoskeletal

Steady gait. No evidence of tremors. Negative Romberg test. No evidence of scoliosis noted. Paravertebrals nontender. Upper and lower extremities symmetric without lesions, swelling or deformities noted. Full ROM in bilateral upper and lower extremities. Cranial nerve XI intact. No evidence of skin tenting in the upper extremities. Capillary refill less than 2 seconds, radial and brachial pulses 3+ bilaterally. Even hair distribution along bilateral lower extremities. No evidence of pitting edema noted. Femoral, popliteal, dorsalis pedis, and posterior tibial pulses 3+ bilaterally. Equal sensation and 5/5 strength in bilateral upper and lower extremities. Negative Babinski reflex.

MEDICAL SURGICAL & CRITICAL CARE BUNDLE

BRAIN LOBES + FUNCTIONS

FRONTAL AKA EXECUTIVE FUNCTION

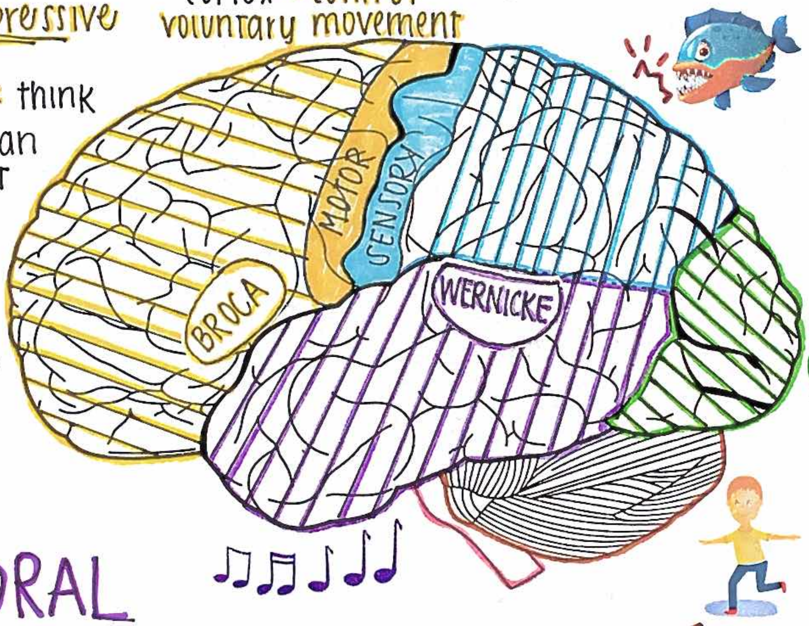
- problem solving
- concentration
- planning + organizing
- reasoning
- personality + behavior + mood
  Regulates emotion

TWO IMPORTANT PARTS:

① **BROCA'S AREA**
- controls expressive speech

{ **IF DAMAGED:** think **"broken"** → can understand but speech is disjointed :(

② **MOTOR AREA**
AKA Primary motor cortex → control voluntary movement



PARIETAL

THINK "PIRANHA" → the piranha is biting the parietal lobe which is extremely sensitive

{ sensations – "piranha"
- perception → body awareness
- attention
- calculations

MAIN FUNCTION:
① **SENSORY AREA**
processes sensory information!!!
- > temp
- > pressure / touch
- > smell, pain, taste

OCCIPITAL

THINK: OPTIC
- > visual system
- > visual information
- Process visuals
- Process perception of shapes and sizes

TEMPORAL

THINK: "TEMPO"
- hearing + attention
- storing verbal and visual memories
  { short term + long term memory
- helps with SOME balance
  THINK: your ear has hearing and balance characteristics
- understanding language / speech

IMPORTANT PART:
① **WERNICKE'S AREA** – Receptive speech
- controls language comprehension

{ **IF DAMAGED:** "wernike is crappy"
→ unable to UNDERSTAND + RESPOND to what people are saying

"FINE TUNE OUR MOVEMENT"

EXTRA: CEREBELLUM

AKA MINI BRAIN
- balance, coordination, rhythm
- proprioception
- posture, movement

BRAIN STEM

- consciousness, breathing, HR

TRAUMATIC BRAIN INJURY

WHAT? External force that causes damage to the brain via **BLUNT** or **PENETRATING** trauma

CAUSE:
- Falls
- Sports related (NFL)
- Motor vehicle Accidents
- Violence
- combat injuries (military)
- body collisions

MECHANISM OF INJURY:

BLUNT:

- **Acceleration:** moving object makes contact with the head → swinging baseball bat
- **Deceleration:** moving head makes concact with stationary object → head hitting the concrete
- **Acceleration-Deceleration:** combination of both AKA coup contrecoup → Whiplash
- **Rotation:** movement of head occurs out of synchrony with rest of body → side impact to the head
- **Compression:** change in shape of skull → between 2 hard objects

PENETRATING:

- An object enters the skull and causes injury (guns, knives, wood, rocks, etc.)

HOW DO WE CLASSIFY?

MECHANISM:
- Blunt (closed)
- Penetrating

SEVERITY: USING GCS
- Mild (13-15)
- Moderate (9-12)
- Severe (3-8)

PATHOLOGY:
- Focal (localized) - sx are related to the specific area damaged
- Diffuse - sx are widespread

SIDE NOTE: Head injury is different from a TBI. Why?
- scalp injury (abrasion, laceration, contusion)
- skull fracture (linear, comminuted, depressed, basillar)

TRAUMATIC BRAIN INJURY

DIAGNOSE: For ALL: CT scan (lesions, cerebral edema, bleeding)

- X-ray (skull and cervical spine fractures or displacement)
- CBC, coags, electrolytes, ABG's
- Glasgow coma scale

INTERVENTIONS:

- #1: Maintain intracranial pressure
  - Increase Head of bed
  - Reduce stimuli
- Monitor respiratory rate, depth and patterns
- Stabilize cervical spine until injury is ruled out
- Maintain patent airway (intubation and ventilation if needed)
- Rotate patient q2h → avoid pressure ulcers
- **Suction AS NEEDED** → not routine (will ↑ ICP)

WE ARE TRYING TO AVOID:

- Increased intracranial pressure
- Infections
- Post traumatic seizure disorder
- Permanent neurologic deficit
- Death

PRIMARY

TRAUMATIC BRAIN INJURIES TYPES

Occurs at the time of impact and results in a focal and/or diffuse injury

① EPIDURAL HEMATOMA

WHERE: Epidural space between the skull and dura mater

HOW: **Blunt trauma OR skull fracture** (Temporal bone fracture most common)

SYMPTOMS: **Breif LOC → Awake → Rapid deterioration**

Others: Headache, obtunded, contralateral hemiparesis, ipsilateral pupil dilation (on the same side as injury)

TREATMENT: Neurosurgical Emergency → surgery to remove pressure

Treat ↑ICP: ↑HOB, reduce stimuli, Mannitol

② SUBDURAL HEMATOMA

WHERE: subdural space between the dura mater and arachnoid

HOW: **Acceleration, Deceleration, Rotation injury** (Brain moves around, ruptures veins and vessels and bleeds into the subdural space)

SYMPTOMS: progressive headache, confusion, disorientation, contralateral hemiparesis, ipsilateral pupil dilation → **SLOW PROGRESSION**

TREATMENT: Neurosurgical Emergency → surgery, May need ventricular drain to relieve pressure

› Treat ICP

③ SUBARACHNOID HEMORRHAGE - TRAUMATIC

WHERE: Bleeding into the subarachnoid space (usually filled with CSF)

HOW: **Blunt Trauma** causing small arteries to tear during initial injury at the surface of the brain

SYMPTOMS: **Worst headache of your life!**

↓LOC, coma, vomiting, seizures, Focal changes depending on area

TREATMENT: Distinguish this is a tSAH and not from a ruptured cerebral aneurysm (stroke)

› Treat ICP to reduce secondary brain injury

PRIMARY

TRAUMATIC BRAIN INJURIES TYPES

④ INTRACEREBRAL HEMORRHAGE

WHERE: cerebral bleed within the brain tissue or ventricles
HOW: **Most common - Penetrating injury**
Less common - depressed skull fracture OR acceleration/deceleration
SYMPTOMS: Headache, contralateral hemiparesis, ↓LOC, vomiting, seizures
TREATMENT: May need an external ventricular drain to releave pressure
Treat ICP to reduce secondary brain injury

⑤ CEREBRAL CONTUSION

WHERE: small bleed/bruising in the surrounding brain tissue
HOW: **coup, coup coutracoup injury**
SYMPTOMS: Range from mild to severe
Headache, confusion, sleepiness, dizzy, N/V, focal changes, LOC
TREATMENT: If severe: External ventricular drain to relieve pressure
Treat ICP to reduce secondary brain injury

⑥ CONCUSSION

WHERE: Most common Frontal and temporal lobes
HOW: Bump, blow or jolt to the head
SYMPTOMS: Breif LOC, Headache, dizzy, N/V

MOST MILD INJURY

SECONDARY BRAIN INJURY

WHAT? changes that evolve over a period of **hours to days** after a **primary brain injury** → cascade of cellular, chemical, tissue or blood vessel changes that cause further damage

GOAL: OXYGENATION, PERFUSE THE BRAIN, AVOID ISCHEMIA

CAUSES:

① PRIMARY INJURY: massive depolarization (K^+ leaves the cell, Na^+, H_2O, Ca^+ enter → edema and damage)

- Aerobic metabolism turns into anaerobic metabolism → lactic acid
- Release of excitatory neurotransmitters
- Release of free radicals → cell damage

② NEUROLOGIC: Major intracranial pressure / HTN → sustained ICP > 20mmHg

- The brain can only compensate so much = ↑ICP
- Blood flow depends on cerebral pressure → increased ICP = decreased blood flow (too much pressure is alot to fight against)
- cerebral vasospasm → constrict blood flow = ischemia

③ SYSTEMIC: Hypotension (SBP <90) → ↓ cerebral blood flow → ischemia → waste products develop = DEATH

- Hypoxia = hypoxemia → anaerobic metabolism → increased lactic acid
- Hypercapnia / Hypocapnia *CO_2 is a vasodilator
  - ↑CO_2 = ↑ cerebral blood flow = ↑ICP
  - ↓CO_2 = constriction = ↓ICP and ischemia
- Anemia
- sodium disorders → swelling or dehydration

INTRACRANIAL PRESSURE

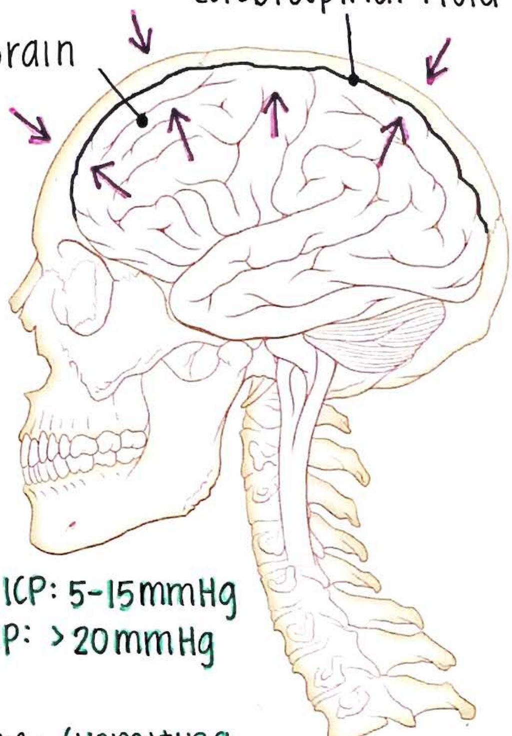
WHAT? When pressure inside the skull dramatically increases

MEDICAL EMERGENCY

3 KEY PLAYERS: Blood
Brain
Cerebrospinal Fluid

When volume of one key player increases, the others must decrease = COMPENSATION

→ If pressure is continuous, it is unable to compensate



NORMAL ICP: 5-15mmHg
BAD ICP: >20mmHg

FACTORS:

- Hyperthermia cause ↑ICP
- Hypoxia or Hypercapnia cause ↑ICP
- Body Position OPTIMAL: 30° or higher
- Arterial and venous pressure
- Anything that increases intraabdominal pressure (vomiting, bearing down)
- TBI's, hemorrhage, tumor, hematoma, hydrocephalus, flexion OR meningitis (↑CSF)

SYMPTOMS:

EARLIEST: Mental status changes (restless, agitated, confused)

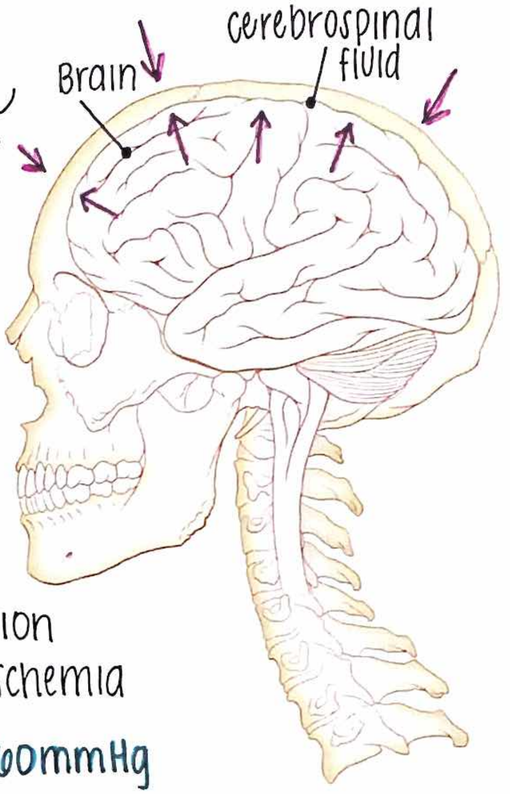
- Double vision, swelling of the optic nerve, DILATED pupils, unequal
- (+) Babinski Reflex
- Decorticate or decerebrate posturing OR Flaccid
- seizures, headache, vomiting WITHOUT nausea
- Deterioration of motor function → weakness or hemiplegia on one side

LATE SIGNS:

- Irregular breathing (Cheynes Stokes)
- unconscious
- Cushings Triad
  - ↑ systolic blood pressure
  - ↓ Heart Rate
  - ↓ Respiratory Rate

INTRACRANIAL PRESSURE

REVIEW AND TREATMENT



TRAUMA OCCURS

↓

The volume of blood, CSF or pressure within the brain itself **increase** → the other structures has to decrease in order to **compensate**

↓

can only do this for **so long** until the condition worsens

↓

Pressure **increases**, blood flow to the brain **decreases**

› Blood pressure tries to increase to compensate for lack of blood flow **(hurting more than helping)**

↓

swelling occurs, widened pulse pressure, compression of certain nerves will cause specific symptoms, ischemia

BAD: ICP >20mmHg, cerebral perfusion pressure <60mmHg

TREATMENT:

- HOB 30° or higher → will help drain fluid
- Keep head midline, **DO NOT flex** the head or neck
- Routine Neuro checks, GCS
- Avoid straining, vomiting, bearing down, coughing
- calm environment, prevent elevated temperature
  - Avoid extra clothing, use antipyretics
- **PREVENT HYPOXIA OR HYPERCAPNIA** - monitor ABG's
  - suction **AS NEEDED** (do not suction more!)
  - Mechanical ventilation $PaCO_2$ lower (30-35) = vasoconstriction = ↓ICP
- External ventricular Drain → monitor ICP level
- **MEDICATIONS**
  1. Barbituates - ↓ICP
  2. Vasopressors or Antihypertensives - maintain BP
  3. Anticonvulsants
  4. Loop Diuretics - watch BP + kidney function
  5. Hyperosmotics - **MANNITOL** (a concentrated sugar) will draw water from the brain back into the blood to be excreted out (watch fluid overload/depletion)

IF UNCONSCIOUS:

Do not over sedate
watch lung sounds
Reposition q2h
Perform light ROM
TREAT AS A CONSCIOUS PATIENT

VENTRICULOSTOMY

WHAT? A surgical procedure that involves creating a hole within a cerebral ventricle for drainage via a drainage system

- When Drainage is TEMPORARY, we will see an EXTERNAL VENTRICULAR DRAIN
- When Drainage is PERMANENT, we refer to this as a SHUNT

INDICATIONS: MOST COMMON: Hydrocephalus, OTHER: hemorrhage, tumor, meningitis, brain injury

WHAT ARE VENTRICLES?

- 4 interconnected cavities of the brain that are filled with CSF and promote circulation of this fluid
- Fluid circulation may become blocked for some reason causing fluid or blood to build up
- Pressure builds → causes brain compression due to limited space
- ↑ICP + damage to brain

External ventricular drain is placed to relieve pressure and monitor ICP

KEY: In some cases when external drainage is permanently necessary, a ventricular shunt is placed (internal drainage system)

NURSING CARE:

FOR EXTERNAL VENTRICULAR DRAIN:

Pressure Transducer MUST ALWAYS stay at the level of the tragus (where ventricles are at)

- Too high above the ear transducer acts like a vacuum
- Too low → CSF will flow backwards

CALL LIGHT before moving!

Dressing changes q2days, monitor for infection

Assess routine GCS and PERRLA

Complications:

TOO MUCH drainage → ventricles collapse
electrolyte imbalance
infection, clogged tubing

DISCHARGE WITHOUT DRAINAGE:

- Follow up CT scan 4 weeks after to assess for fluid rebuild up

FOR VP SHUNT:

Avoid activities or sports with head contact

No submersion in water until approved by doctor

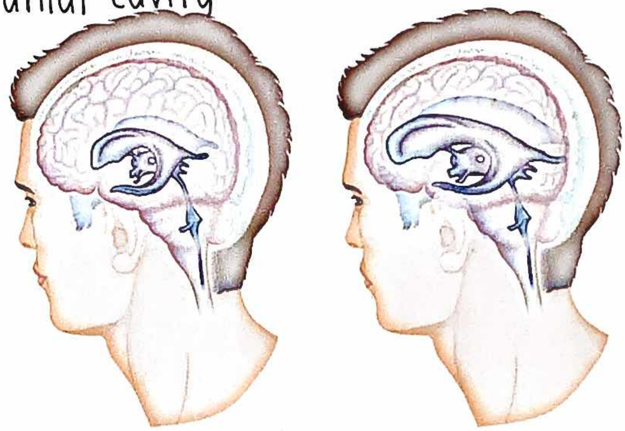
Risk of infection!

Follow up every 3 years

HYDROCEPHALUS

WHAT? Buildup of cerebrospinal fluid in the ventricular system resulting in the enlargement of the intracranial cavity

WHAT ARE VENTRICLES? 4 interconnected cavities of the brain that are filled with CSF and promote circulation of this fluid



CAUSE:

OBSTRUCTION: Partial obstruction in the normal flow of CSF

- Bleeding in the brain from stroke or head injury
- Tumors, lesions, masses on brain/spinal cord

MALABSORPTION: Villi and vessels have trouble absorbing CSF → Builds up

- Inflammation of brain tissue (bacterial meningitis)

INCREASED RISK IN INFANTS + OLDER ADULTS

SYMPTOMS:

- unusually large head size or circumference
- Prominant scalp veins, headache
- Downward deviation of eyes (sunset sign)
- vomiting, sleepiness, nausea
- abnormal walking, instability, confusion

DIAGNOSTICS:

- CT scan, MRI
- Lumbar puncture to assess if shunt will be successful
- ICP monitoring

TREATMENT:

1. Ventriculostomy - Drain the excess CSF (AKA Endoscopic Third Ventriculostomy)
2. Shunt → placed in the ventricle and threaded to another part of the body to drain CSF so that it can be absorbed

   PATIENT WILL HAVE THIS FOR REST OF LIFE
3. Remove the cause of obstruction (tumor)
4. Teach about long term follow up of shunt
5. Teach about the Meningitis vaccine

SEIZURES

WHAT? **sudden and uncontrolled release** of electrical activity within the brain that causes **changes** in behavior, movements and LOC

CAUSES:

- Genetics, stroke
- Head Trauma
- Tumors in the brain
- Meningitis or other infections
- Damage to the brain in utero
- Drug/alcohol withdrawal

LIFE THREATENING:

① Status Epilepticus → seizure lasting >5min OR 2+ seizures back to back without regaining consciousness
- Death or permanent brain damage

② sudden unexplained death in epilepsy
RISK: unmedicated pts with Tonic-clonic

TYPES:

① FOCAL (PARTIAL) SEIZURES

Located in **one part** of the brain

A) **simple focal** → do not cause LOC
- alter senses, tingling
- jerking movements, flashing lights

B) **complex focal** → LOC OR changed awareness
- staring off
- repetitive movements
- confused/dazed

② GENERAL SEIZURES

All areas of the brain

A) **Absence** → children
- staring off, loss of awareness, sudden regain

B) **Tonic** → stiffening of muscles (falling down)

C) **Atonic** → complete loss of muscle control

D) **Clonic** → jerking movements often in face or arms

E) **TONIC CLONIC (GRAND MAL)**
- **most intense**
- abrupt LOC
- Body shaking, loss of bladder control
- tongue biting

TREATMENT:

MEDICATIONS: Antiseizure, antiepileptic Anticonvulsants

- Vagus nerve stimulation - Device implanted under chest
- **NEVER** put anything in the patients mouth **(RISK aspiration)**
- **ALWAYS** make sure patient is lying on their side! **(RISK aspiration)**
- Monitor LOC, Neuro checks routinely

STROKE

WHAT? Inability of oxygen rich blood to reach the brain due to **blockage or bleeding** in a vessel

TYPES:

① ISCHEMIC:
Narrowing of blood vessels in the brain that leads to blood clotting, blockage and severely reduced blood flow to the brain (ischemia)

HOW? Embolus leaves another part of the body and travels to the brain
› Thrombus forms from atherosclerosis in the brain

② HEMORRHAGIC:
Broken blood vessel in the brain causes bleeding (swelling occurs because blood accumulates)

HOW? #1 cause: Aneurysm, OTHER: Trauma, uncontrolled HTN, old age

SYMPTOMS:

- Altered LOC, headache, facial drooping
- 1 sided weakness/paralysis, respiratory distress
- speech/visual problems, N/V, vertigo
- unequal pupils, trouble swallowing, seizures
- bladder/bowel incontinence, ↑↓ BP

REMEMBER:

- **F**: facial drooping: ask pt to smile
- **A**: arms: raise arms
- **S**: speech: repeat simple phrase
- **T**: time to call 911

DIAGNOSE: CT SCAN
(Key: Hemorrhagic is NOT a candidate for tPA)

INTERVENTIONS:

- NPO until swallow test due to ↓ or absent gag reflex
- Obtain baseline neuro data (NIH stroke scale)
- Fluid + Electrolyte balance to plan perfusion
- Airway: Remove Dentures
- Pulse ox + O_2 / intubate, monitor vitals
- IV with normal saline → Maintain or ↑ BP
- Prevent hyperthermia (will cause vasodilation → ↑ICP) – use Aspirin

Risk of seizure w/in 24 hours!

If not a candidate for **tPA**, they can have **surgery** to remove hematomas

tPA:
administered w/in **4.5hr of ONSET** of symptoms

- must have neg. hemorrhage
- must have nml INR, glucose + platelets
- controlled BP
- must NOT had anticoags recently

CLOT BUSTER

Monitor bleeding, H+H, clotting factors, **↑HOB** with head midline to ↑ perfusion

No new IV's or injections!

NIH STROKE SCALE

1A. Level of consciousness	0 = Alert 1 = Not alert, but arousable by minor stimulation 2 = Not alert, but arousable by repeated stimulation 3 = Unresponsive or responds only with reflex
1B. Level of consciousness questions: What is the month? What is your age?	0 = Both answers correct 1 = Answers 1 question correctly 2 = Answers 2 questions correctly
1C. Level of consciousness commands: Open and close your eyes Grip and release your hand	0 = Performs both tasks correctly 1 = Performs 1 task correctly 2 = Performs neither task correctly
2. Gaze *Ask the patient to follow your finger with only the eyes	0 = Normal 1 = Partial gaze palsy 2 = Forced deviation
3. Visual *Ask the patient to cover one eye and hold up fingers in all 4 quadrants	0 = No visual loss 1 = Partial hemianopia 2 = Complete hemianopia 3 = Bilateral hemianopia
4. Facial palsy *Ask the patient to smile, lift eyebrows, squeeze eyes tightly shut	0 = Normal symmetric movements 1 = Minor paralysis 2 = Partial paralysis 3 = Complete paralysis of 1 or both sides
5. Motor arm movements (10 seconds) 5A. Left arm 5B. Right arm	0 = No drift 1 = Drift 2 = Some effort against gravity 3 = No effort against gravity; limb falls 4 = No movement
6. Motor leg movements (5 seconds) 6A. Left leg 6B. Right leg	0 = No drift 1 = Drift 2 = Some effort against gravity 3 = No effort against gravity; limb falls 4 = No movement
7. Limb ataxia *Finger-to-nose *Heel-to-chin	0 = Absent 1 = Present in 1 limb 2 = Present in 2 limbs
8. Sensory *Pin prick to face, arms, trunk and legs	0 = No sensory loss 1 = Mild to moderate sensory loss 2 = Severe or total sensory loss
9. Best language *Name items, describe pictures, read sentences	0 = No aphasia 1 = Mild to moderate sensory loss 2 = Severe aphasia 3 = Mute; global aphasia
10. Dysarthria *Evaluate speech clarity by reading a sentence	0 = Normal 1 = Mild to moderate dysarthria 2 = Severe dysarthria
11. Extinction and inattention	0 = No abnormality 1 = Visual, tactile, auditory, spatial or personal inattention 2 = Profound hemi-inattention or extinction

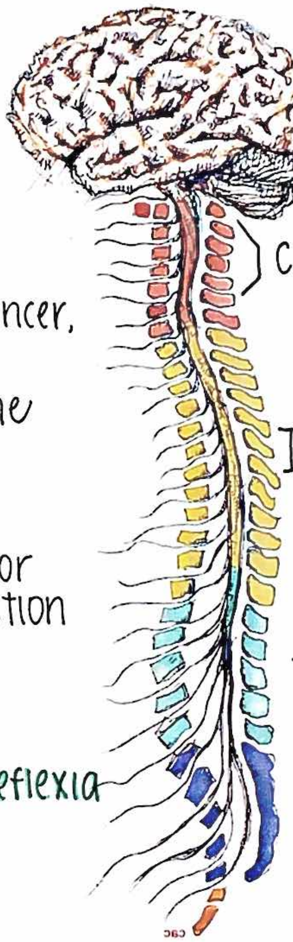
Minor Stroke: 1 – 4; Moderate Stroke: 5 – 15; Moderate to Severe Stroke: 16 – 20; Severe Stroke: 21 – 42

SPINAL CORD INJURY

WHAT? **Damage to any part of the spinal cord or nerves** that often causes permanent changes in strength, sensation and other body functions below the site of injury

CAUSES: Trauma to any point of the spinal cord that fracturs, dislocates, crushes or compresses the vertebrae

- Motor vehicle accident
- Falls, Violence
- sports injuries
- stabbing
- gun shot wounds
- Nontraumatic: Alcohol, cancer, arthritis



SYMPTOMS: Motor and sensory impulses below the point of injury may not be sent

- blurry vision, flush skin
- LOSS OF MOVEMENT
- Feeling hot, restless, anxious
- loss of bladder or bowel function
- spasms, stinging (nerves damaged)
- Altered sensation to heat, cold, touch
- impaired breathing, coughing (C3-C5)
- Neurogenic shock symptoms OR Autonomic Dysreflexia

TREATMENT:

RIGHT NOW:

- Immobilize the spine
  - Neck collar
  - HOB flat
  - log roll technique

  (until SCI is determined)

ONGOING:

- Rotate q2h to avoid pressure ulcers
- Passive + Active ROM → blood clots
- Encourage PT/OT
- Analgesics + muscle relaxants

ACUTE STAGE:

- maintain airway (C3-C5 will impact breathing)
- Keep neck immobilized
- Prevent shock → Neurogenic: First 24-72 hours!
- Watch for Autonomic Dysreflexia: At any time!

- ABOVE T6
- S/S: Flush skin, ↑ temp

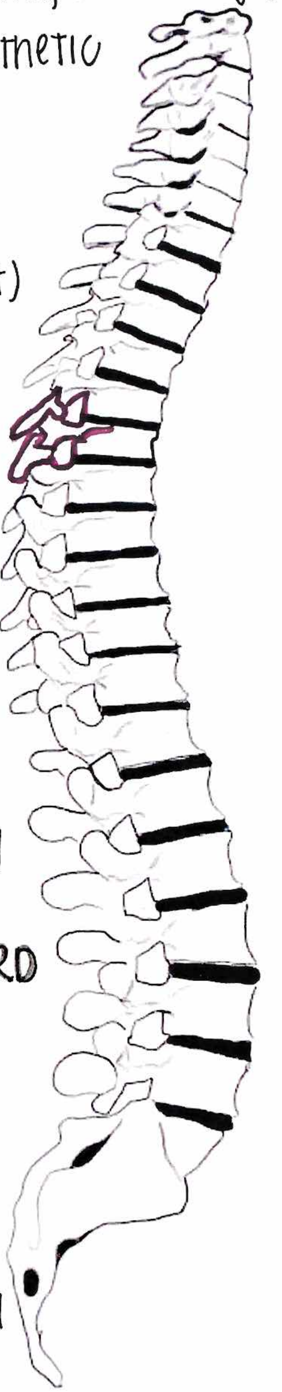
NS: ↓ BP ↓ HR

AD: ↑ BP ↓ HR

NEUROGENIC SHOCK: INJURY TO THE SPINAL CORD ABOVE T6

Normally, the **sympathetic nervous system** controls our **fight or flight response** → will cause vasoconstriction, increased HR and increased BP (among other things)

IN NEUROGENIC SHOCK, the **SNS loses its ability** to do its job so it will act like the parasympathetic nervous system = **VASODILATION**



T6

SYMPTOMS:

- Decreased SVR → Decreased CO
- Decreased PAWP (low filling pressure in the heart)
- HYPOTENSION!!
- venous pooling, hypothermia (trunk is cold due to pooling)
- BRADYCARDIA, warm, dry extremities
- Faint pulse, trouble breathing

TREATMENT: First, immobilize the spine!

- Immediate fluid resuscitation for blood pressure → ↑ BP → ↑ venous return → ↑ CO
- vasopressors → constriction → ↑SVR → ↑BP/CO

  KEY: watch fluid overload (there is no fluid loss with this shock)
- Atropine
- watch urine output, Risk DVT due to vasodilation
- May need intubation or mechanical ventilation depending on injury

AUTONOMIC DYSREFLEXIA: IRRITATION TO THE SPINAL CORD ABOVE T6

The **sympathetic nervous system** is **irritated** and causes a sudden increase in its function

CAUSE: Bladder Distention, Bowel disorder, Restrictive clothing

SYMPTOMS: sudden vasoconstriction → ↓BP above site of injury and ↑BP below the site

- sweat gland stimulation, pounding headache, dilated pupils, ↓HR or ↑HR

TREATMENT:

- **Ensure bladder is empty** (look at urine output, bladder scan, foley)
- Assess bowel sounds / Last BM?
- **Remove irritating clothing / blankets**
- Assess BP routinely → watch for s/s again q2-5min
- **Move into sitting position!**
- vasodilators

ANTICONVULSANTS

① PHENYTOIN

ACTION: slows down impulses in the brain that cause seizures

USE: Treat and prevent seizures

SIDE EFFECTS: GINGIVAL HYPERPLASIA!

› Diplopia, Rash, ↓ BP

THERAPEUTIC RANGE: 10-20mcg/mL

KEY: ↓ effectiveness of oral contraceptives

Avoid Milk + antacids (↓ absorption)

Take with food ; **Regular dental checkups**

SIGNS of TOXICITY:

Nystagmus, slurred speech

Ataxia, vomiting

② LAMOTRIGINE

ACTION: Inhibits Na+ transport → ↓ seizures

USE: Best for partial seizures, mood stabilizer

SIDE EFFECTS: ↑ Risk of suicidal thoughts

Double vision, Headache

Drowsy, Dizzy, N/V

KEY: Watch for worsening depression or mood changes

› DO NOT STOP ABRUPTLY

› ↓ evectiveness for oral contraceptives

③ BARBITUATES (PHENOBARBITAL)

ACTION: stimulates GABA → elevates seizure threshold → ↓ excitement in brain

USE: Tonic clonic, focal, status epileptious

SIDE EFFECTS: Drowsy, Ataxia, Respiratory depression, ↓ BP

THERAPEUTIC RANGE: 15-40 mcg/mL

KEY: Monitor breathing and routine neurochecks

④ VALPROATES (VALPROIC ACID)

ACTION: not fully understood, may ↑ levels of GABA

USE: simple + complex seizures

SIDE EFFECTS: N/V/D, dizzy, drowsy

Tremor, Tinnitus

↑ Bleeding time

↓ PlateleT count

KEY: monitor WBC's, platelets, liver enzymes, LFT's

⑤ CARBAMEZEPINE

ACTION: Inhibits Na+ transport → ↓ seizures

USE: Tonic clonic, partial, mood stabilizer

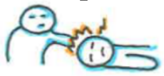
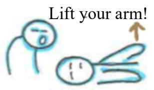
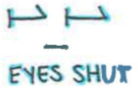
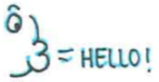
SIDE EFFECTS: AGRANULOCYTOSIS! → infection risk

Hyponatremia, Dizzy, drowsy, N/V

KEY: Watch for worsening depression or mood change

› DO NOT STOP ABRUPTLY

GLASGOW COMA SCALE

	+1	+2	+3	+4	+5	+6
MOTOR RESPONSE	No response	Abnormal extension (decerebrate)	Abnormal flexion (decorticate)	Flexion withdrawal from pain 	Moves to localized pain	Obeys commands 
VERBAL RESPONSE	No response **V** Voiceless	Incomprehensible sounds **O** Oooohhh!!	Inappropriate words **I** Inappropriate	Confused conversation **C** Confused	Oriented to time, place, and person **E** Elegant speech	
EYE OPENING RESPONSE	No response 	Responds to pain	Responds to verbal command, speech, shout 	Spontaneously opens eyes		

Score 3-8 points → **severe** head injury
Score 9-12 points → **moderate** head injury
Score 13-15 points → **mild** head injury

CRANIAL NERVES I–XII

			MNEMONIC
I	OLFACTORY	SMELL	OH
II	OPTIC	VISUAL ACUITY (SNELLEN)	OH
III	OCULOMOTOR	EYE MOVEMENT PUPIL DILATION	OH
IV	TROCHLEAR	VERTICAL EYE MOVEMENT	TO
V	TRIGEMINAL	SENSORY FROM FACE FACIAL EXPRESSION	TAKE
VI	ABDUCENS	LATERAL EYE MOVEMENT	A
VII	FACIAL	TASTE, FACIAL EXPRESSION	FAMILY
VIII	AUDITORY AKA vestibulocochlear	HEARING + BALANCE	VACATION
IX	GLOSSOPHARYNGEAL	"Ahhhh" SWALLOWING	GO (to)
X	VAGUS	SENSATION IN THROAT GAG REFLEX	VEGAS
XI	ACCESSORY	HEAD + SHOULDER MOVEMENT	AFTER
XII	HYPOGLOSSAL	TONGUE MOVEMENT	HOURS

CRANIAL NERVE TIPS

IN THE ORDER I WOULD DO ON EXAM

II – OPTIC (snellen → while they are standing so you can seat them for the rest)

Then I move down the face ☺

III, IV, VI – OCULOMOTOR, TROCHLEAR, ABDUCENS *EYE TESTS*

VIII – VESTIBULOCOCHLEAR *EARS*

I – OLFACTORY *NOSE*

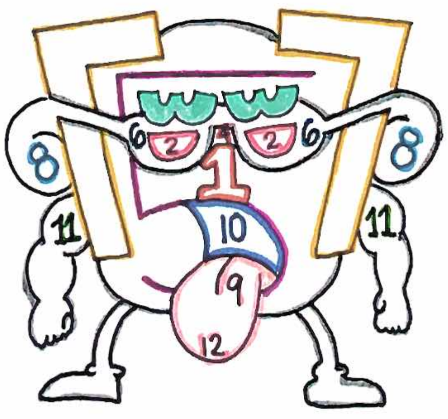
V – TRIGEMINAL *FACE/MOUTH*

VII – FACIAL *EXPRESSION*

IX, X – GLOSSOPHARYNGEAL, VAGUS *INSIDE OF MOUTH*

XII – HYPOGLOSSAL *TONGUE*

XI – ACCESSORY *SHOULDER + HEAD MOVEMENT*



SIADH

Syndrome of Inappropriate Antidiuretic Hormone

DI

Diabetes Insipidus

ADH is stored in the pituitary gland and released when the body experiences a decrease in blood volume...

TOO MUCH ADH is released = kidneys **retain excess water!**

NOT ENOUGH ADH to release = kidneys **cannot save water!**

SIADH

CAUSE

1. **Disorders of the brain** (injury, tumors, infection)
2. **Brain surgery** in the hypothalamus region
3. **Lung disease** (TB, CX)
4. **sepsis**

SYMPTOMS: Soaked Inside

- Low urination → body is **holding** H_2O
- **sticky, thick urine** – urine is concentrated = **HIGH** specific gravity >1.030
- **SWOLLEN INSIDE**
  - → Hypoosmolality
  - → Hyponatremia = **DILUTED**
- seizures (watch headache/confusion)
- **severely high BP**

TREATMENT

1. Fluid restriction
2. Loop diuretics
3. correct sodium deficit (give hypertonic IV)
   → will treat SIADH by replenishing sodium
4. **DAILY WEIGHTS**
5. **seizure precaution** → watch for headache, confusion, lethargy

IF untreated = coma/death

DI

CAUSE:

1. **Damage** to hypothalamus (radiation or surgery)
2. **Disorders** of the brain
   → Brain injury = ↑ICP = pressure on pituitary gland
3. **Lung disease** (TB, pna, cancer)

SYMPTOMS: Dry Inside

- Polyuria → body is releasing **too much** H_2O = ↑ urine output
- Diluted urine = **LOW** specific gravity <1.005
- **DRY INSIDE**
  - → Hyperosmolality
  - → Hypernatremia = **DEHYDRATED**
- **Dry** skin/mucus membranes = Thirsty
- Decreased BP

TREATMENT

1. -Pressin drugs = ↑ fluid in body
2. Encourage fluids
3. IV fluids (Normal saline) slowly
4. Watch for **seizures!**
   We have an **electrolyte imbalance** here!
5. **DAILY WEIGHTS**

ADDISON'S DISEASE

CUSHING SYNDROME

ABSENT steroids ← All about the **steroids** → **CUSHION** of steroids

Addison's Disease

WHAT: The adrenal glands **do NOT** produce enough steroid hormones specifically **cortisol + aldosterone**

CAUSE:
- **A**- Autoimmune disorder (body kills adrenal or pituitary)
- **D**- disease (cancer)
- **D**- damage to adrenal/pituit.

SYMPTOMS: low, low, low
- **LOW** BP
- **LOW** temperature (cold intolerance)
- **LOW** sodium and blood sugar
- **LOW** mood and energy
- **LOSS** of body hair
- **LOW** weight due to fluid loss
- **HIGH** potassium → muscle spasm, **peak T wave, ST elevation**
- **HIGH** pigmentation

THINK: a girl named **Addison** who is **skinny, weak** and **tan**

TREATMENT: ADD STEROIDS!

1. Lifelong steroid therapy **(-sone)**
   Watch for too much steroid therapy:
   - swollen (water/wt gain)
   - sepsis (slow wound healing)
   - hyperglycemia
   - osteoporosis, Risk cataracts
2. **DIET:** ↑ protein
   ↑ carbs
   ↑ sodium

Cushing Syndrome

WHAT: The adrenal glands **do** produce **TOO MUCH** steroid hormones, specifically **cortisol**

CAUSE: long term steroid use (-sone)
Tumors on adrenal/pituitary
small cell lung cancer

SYMPTOMS: CUSHION!!! HIGH!
- **High** BP
- **High** sodium (hypernatremia)
- **High** blood sugar
- **High** risk of infection (slow wound healing)
- **Excess** of body hair (hirsutism = "hairy suit")
- **BIG, ROUND** abdomen → overweight
- **Moon face, buffalo hump**, rosy cheeks, stretch marks

THINK: a **big, round (cushion), hairy man**

TREATMENT:

1. Control the cause → **cut** out tumor **OR reduce** steroid dosage

KEY: **sudden drop** in steroid or removal of tumor **may cause**:

ADDISONIAN CRISIS:
1. ↑ **dosage** of steroids in times of ↑ **stress** (surgery, illness)
2. Do not abruptly **STOP** abruptly medication
3. Watch for low BP
4. Give IV push steroids, 0.9% NS, dextrose

- If tumor or gland **removal**, pt **MUST** stick to life long steroid meds

HYPER- THYROIDISM HYPO-

In a normal hypothalamus, the pituitary gland will produce TSH to stimulate the thyroid to release (produce) T3, T4, calcitonin.

Hyper: TOO MUCH T3 + T4 (Pituitary will make LESS TSH to slow down)

Hypo: NOT ENOUGH T3 + T4 (Pituitary will make more TSH to speed up)

HYPERTHYROIDISM

CAUSES (↑T3, ↑T4)

1. **GRAVES disease** (Think Graves = Gains = HIGH)
2. Iodine excess
3. Levothyroxine excess

SYMPTOMS: HIGH and HOT

- Grape eyes → Exopthalamos (use eyepatch/tape eyes)
- Golf balls in throat → goiter
- High BP, HR
- Heart palpitations
- Hot and sweaty skin / Heat intolerance
- High GI "Diarrhea"

HIGH TEMP NOT DRY!

DIET

YES: High calories, protein, carbs
Frequent meals

NO: High fiber, caffeine or spicy food

TREATMENT

1. PTU Propylthiouracil → Puts the Thyroid Underground
2. Methimazole
3. Beta Blockers
4. SSKI → shrinks thyroid

+ Reduce excess levothyroxine

WATCH FOR THYROID STORM

HYPOTHYROIDISM

CAUSES (↓T3 + ↓T4)

1. HASHIMOTOS
2. Low dietary iodine
3. Pituitary tumor
4. Thyroidectomy

SYMPTOMS: LOW and SLOW

- low RR (place trach kit at bedside)
- low HR, BP
- low temp (NO electric blankets)
- low energy (fatigue, weak, achey)
- low metabolism + GI (constipation, ↑ weight and H_2O)
- Hair loss
- low mood / sex drive
- low LOC → forgetful
- slow, dry skin turgor
- slow menstration

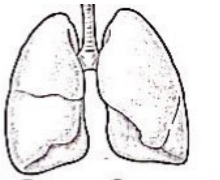
DIET

LOW calories, saturated fat, cholesterol
Frequent Rest

TREATMENT

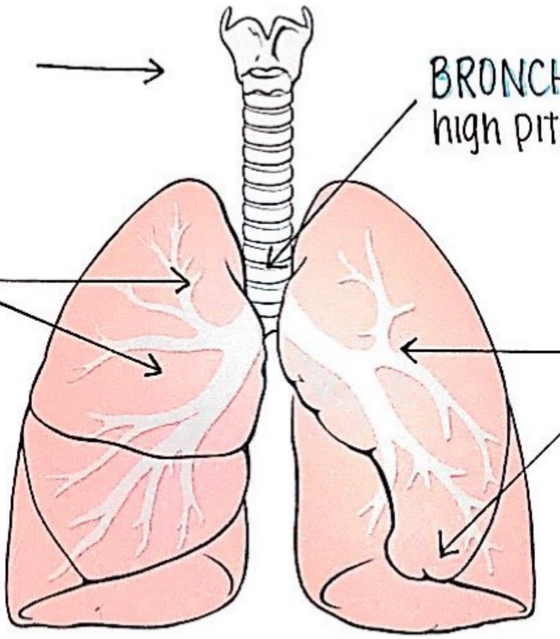
1. Levothyroxine! → leaves T3 + T4 in the body

WATCH FOR MYEXDEMA COMA

AUSCULTATING  SOUNDS

NORMAL and ABNORMAL

NORMAL:



TRACHEAL: harsh, hollow

BRONCHIAL: high pitched, loud, hollow

BRONCHOVESICULAR: low pitched, hollow
Anterior + posterior

VESICULAR: low pitched, blowing
Anterior + posterior

ABNORMAL:

① **WHEEZING:** high pitched, **musical**
- air is moving through a narrow airway
- heard on inspiration or expiration
- continuous
- **EX:** asthma, sputum, inflammation

② **CRACKLES:**
FINE: hair moving through fingers
woodburning
- clears when coughing

COARSE: low, bubbling sound
- not cleared when coughing

- air being forced through narrow airway or alveoli
- heard on inspiration the most
- discontinuous
- **EX:** infection of bronchi, bronchioles, alveoli
pulmonary edema, ARDS

③ **STRIDOR:** high pitched, **wheezing**
- mostly heard on inspiration, occasionally on expiration
- disrupted airflow in larynx or trachea

EX: croup, foreign body in airway, infection

④ **RHONCHI:** low pitched, **rumble**
- sounds like a **SNORE**
- narrow airway in trachea or bronchi
- heard on inspiration + expiration
- clears with coughing
- continuous
- **EX:** COPD, CF

⑤ **PLEURAL FRICTION RUB:**
- **harsh**, grating, **LEATHERY**
- inflamed pleura
- heard on inspiration **AND** expiration
- may be discontinuous or continuous.
- often mistaken for coarse crackles

EX: rheumatic fever,
tuberculosis
autoimmune disorder
chest trauma

ASTHMA AND ASTHMA ATTACKS

WHAT? Chronic lung disease that causes **inflammation** and **narrowing** of the bronchi and bronchioles

DURING ASTHMA ATTACK:

1. **Smooth muscle** constricts causing chest tightness and dyspnea
2. **Mucosal lining** creates excess mucus production + inflammation
   - Decreases Airflow → coughing, wheezing, **AIR TRAPPING** (Respiratory Acidosis)
3. **Goblet cells** collect bacteria to prevent it from going into the airway

TRIGGERS:

- smoke, **pollen**, pollution, perfume
- Dander, dust, pests, mold
- **cool and dry air**
- Respiratory infection
- **Exercise**
- GERD, Hormonal shift
- Beta blockers, NSAIDs, Aspirin, sulfites

NURSING CARE:

- continuous vital signs
- Keep the patient **calm**
- **HIGH FOWLERS**
- **OXYGEN / BRONCHODILATORS**
- Assess lung sounds, cyanosis, ease of speaking, and Peak Flow best

PEAK FLOW:

PERSONAL BEST: Highest # over a **2-3WK** period when asthma is controlled

GOOD: 80-100%

CAUTION: 60-80%

DANGER: <60% → GO to Doctor!

SIGNS + SYMPTOMS:

EARLY:

- **SOB**, **wheezing**, easily fatigued
- cough at night, trouble sleeping
- sneezing, scratchy throat
- ↓ Peak Flow best

ACTIVE:

- **chest tightness**, Tachycardia, ↑RR
- cough, wheezing, dyspnea
- <90% O_2

SEVERE:

- Rescue inhaler **does not work**
- **cant speak**, chest retractions
- cyanosis of lips/skin, sweating

Acute Attack: FAST RELIEF

1. Albuterol → Bronchodilator
2. Ipratropium

Long Term Control:

1. Salmeterol
2. corticosteroid (-SONE)
3. Montelukast Oral

PNEUMOTHORAX

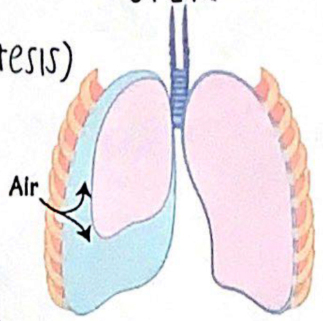
AKA COLLAPSED LUNG → **Air enters** the pleural space, disrupts negative pressure, and causes **lung collapse**

Key: Total collapse = Pneumothorax
Partial collapse = Atelectasis

CAUSE:

Blunt Force Trauma (gun shot wound, stabbing)
- **Medical Procedures** (central line placement, thoracentesis)
- **Mechanical Ventilation** (too much PEEP)

OPEN

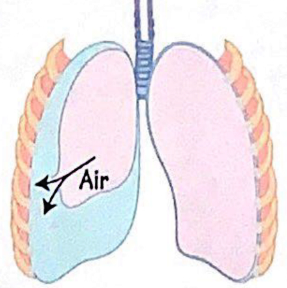


① OPEN PNEUMOTHORAX:

Penetrating thoracic injury that causes air to enter from the outside in

AKA sucking chest wound → Tx: sterile occlusive dressing covered on **THREE sides** (prevent additional air from entering + allows trapped air to escape)

CLOSED



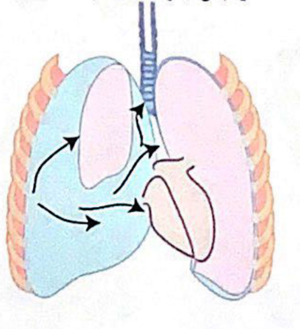
② CLOSED PNEUMOTHORAX:

Air enters the pleural space without an outside wound

CAUSE: **Traumatic impact** (MVA)
Spontaneous - Ruptured bleb on lung, change in altitude

Primary spontaneous: without history of lung disease
Secondary spontaneous: with presence of lung disease

TENSION



③ TENSION PNEUMOTHORAX:

complication of OPEN AND CLOSED!!

worsening of a pneumothorax where air accumulates so much and cannot escape → **increased intrathoracic pressure**

- Pressure starts to **shift** onto the **heart, good lung and trachea**
- Body tries to compensate by ↑ breathing but heart has nothing to pump = **↑HR, ↓CO, ↓BP**

SIGNS + SYMPTOMS:

FOR ALL: sudden chest pain, cyanosis, unequal chest expansion, dyspnea, ↓O_2 ↓BP ↑HR, absent breath sounds

OPEN: **sucking** chest sound

TENSION: **Trachea pushed** to the side, subQ emphysema (CO_2 escapes to skin)

TREATMENT:

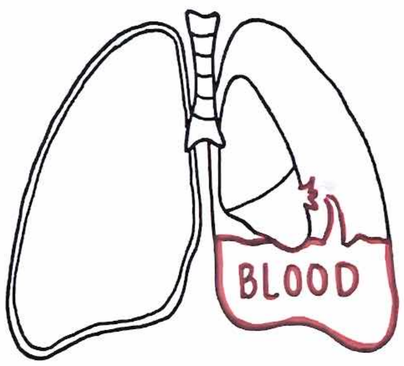
IMMEDIATE: **Open** = sterile occlusive dressing
Tension = needle decompression

FOR ALL: **CHEST TUBE INSERTION** (Perform chest tube care)

- **HOB** in **Fowlers** for breathing, O_2, monitor vitals (BP, HR, RR). **Assess rise and fall** of chest

HEMOTHORAX

WHAT? similar to pneumothorax, but instead **blood collects in the pleural space** and causes the lung to collapse



CAUSE: **Puncture wound** from a broken rib, stab wound or gunshot, etc.

- **Blunt force injury** (car accident, violence, etc.) that cause internal structures to rupture → OR **pulmonary embolism**, **tear** in blood vessel from HTN

SYMPTOMS:

- sudden chest pain, rapid heart rate
- cold, pale, clammy skin
- low BP, rapid, shallow breathing
- Dyspnea, feeling restless or anxious

Blood accummulation ≥1000mL → SHOCK

TREATMENT:

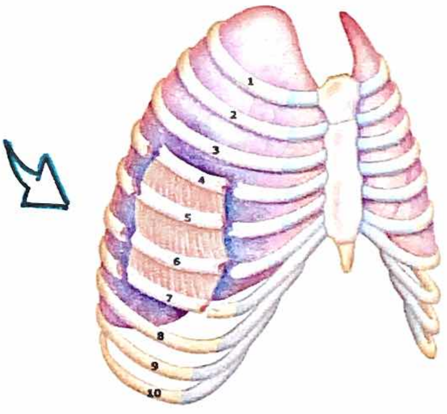
#1: CHEST TUBE INSERTION to drain blood and fluid from the pleural space and reinflate the lung

- Monitor breath sounds: blood accumulation → **HYPORESONANT**
- stop bleeding at source, watch O_2

FLAIL CHEST

WHAT? A section of the chest wall that **moves independently** of the thoracic cage

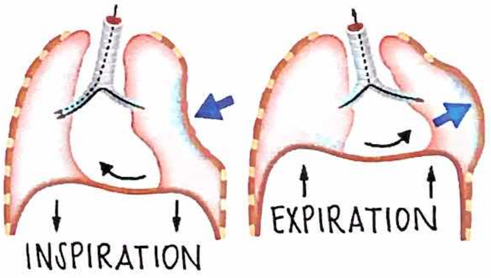
CAUSE: **MULTIPLE RIB FRACTURES** from blunt force trauma (MVA, Fall, sports)



SYMPTOMS:

- Pain and tenderness with trouble breathing
- Bruising and inflammation
- **PARADOXICAL CHEST MOVEMENT!** uneven chest movement

  inward on inhalation / outward on exhalation → ↓ ventilation, ↓ gas exchange



TREATMENT:

Oxygen, Pain medication, **If severe:** mechanical ventilation to keep chest stable

- **May need surgery to stabilize ribs**

HYPOVOLEMIC SHOCK

WHAT? when the body loses more than 20% of its blood or fluid supply causing inadequate cardiac output, BP and perfusion

CAUSE:

RELATIVE CAUSE: inside fluid shift leaving the intravascular space

- we DO NOT see this happening → fluids collect or leak somewhere inside the body

EX: internal bleeding, severe burns (↑ capillary permeability) damage to organs, sepsis (massive vasodilation)

ABSOLUTE CAUSE: outside fluid shift from intravascular space

- we DO see this → fluid leaves the body

EX: massive bleeding from surgery or injury, severe vomiting, severe diarrhea, postpartum hemorrhage

PATHO:

1. cause occurs
2. low venous return to the heart
3. cardiac preload decreases
   Preload: the amount ventricles stretch at the end of diastole
4. stroke volume decreases
   SV: amount of blood the heart pumps each beat (NML= 50-100mL)
5. cardiac output decreases (NML: 8-4L/min)
6. Decreased tissue perfusion → ischemia

SYMPTOMS:

- ↓BP → ↑SVR (due to vasoconstriction as compensation)
- ↑HR, ↑RR, weak thready pulse
- cool pale skin, oliguria, mottled skin
- slow capillary refill, anxious/confused/agitated
- organs begin to fail → coma

TREATMENT:

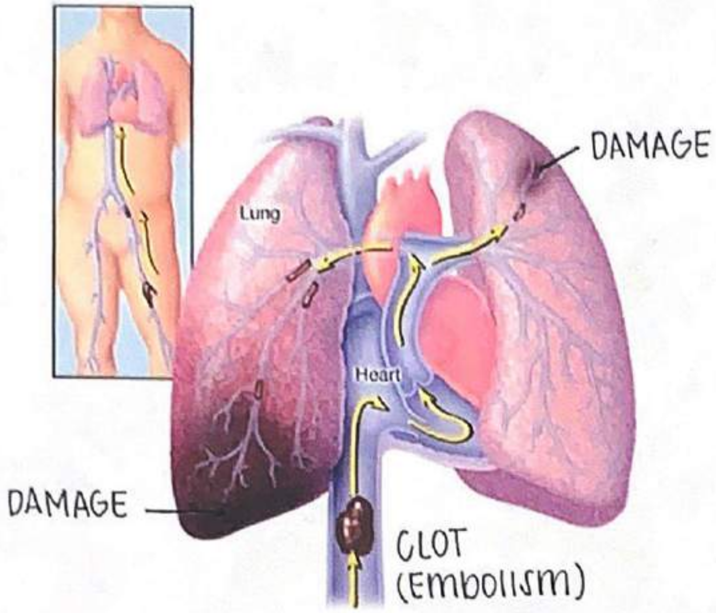
- **FLUID RESUSCITATION!** Normal saline or LR until blood can be matched
- Trendelenburg to ↑ venous return and ↑CO
- Monitor for fluid overload (crackles, JVD, swelling)
- O_2 or mechanical ventilation
- Active bleed – hold pressure
- Monitor labs – VOP, BUN, Cr, Hgb, HCT
- vasopressors, N/V/D medications
- Hemodynamic Monitoring
  GOAL: ↑CVP and PAWP

PULMONARY EMBOLISM

WHAT? **Blockage** in one of the pulmonary arteries caused by **blood clots** that travel to the lungs from deep veins

⇩

LIFE THREATENING



OTHER CAUSES:

1. Fat from a marrow of a broken long bone
2. Tumor
3. Air Embolism (air bubbles)

RISK FACTORS: **untreated DVT** or any cause associated with DVT (immobility, trauma, surgery, heart disease, smoking, lifestyle factors)

SYMPTOMS:

- **sudden shortness of breath**, worse with exertion
- sharp chest pain, worse with deep breathing
- **↑HR**, lightheaded, dizzy, sweating, cough
- **cool, clammy**, ↓O_2, cough up blood
- syncope, ↓BP, ↑Temperature

DIAGNOSE:

- ventilation-perfusion scan
- Pulmonary angiogram
- CT pulmonary angiography
- MRI

TREATMENT:

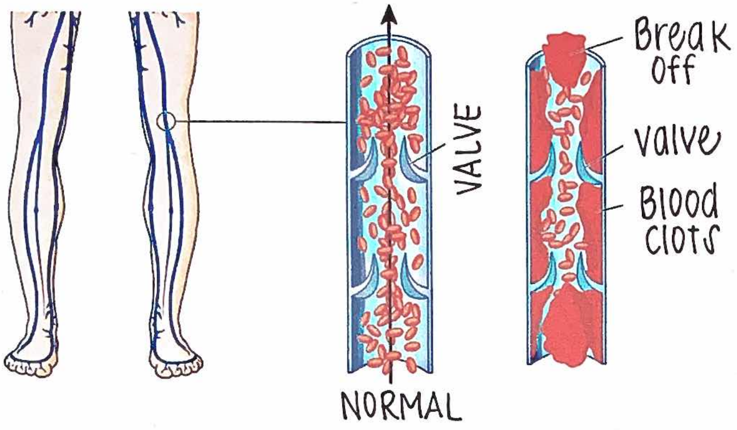
- **Assess** breathing and vital signs
- Provide additional respiratory support
- Place patient in **High Fowlers**
- **Medications:**
  1. **Anticoagulants** → does **NOT** dissolve clot
     - will prevent existing clot from growing and prevent new ones from forming
     - Heparin/Warfarin
  2. **Thrombolytics**
     - **clot buster** → ↑risk of bleeding
     - **Do not** give in central line
     - Monitor bleeding
- **Educate** on risk factors
- surgical **clot removal** if needed

DEEP VEIN THROMBOSIS

WHAT? A **blood clot (thrombus)** forms in a **deep vein**, usually in the lower extremities → This is a **serious condition** because a blood clot can break apart, enter normal circulation, return to the heart and **lodge into the lungs**

⇩

PULMONARY EMBOLISM



CAUSES: VIRCHOWS TRIAD

① VENOUS STASIS

- Weakening of vein valves
- Prolonged immobilization
- Atrial Fibrillation / Polycythemia

② HYPERCOAGULABILITY

- ↑ Factor V, obesity
- cancer, chemotherapy
- Birth control / Pregnancy

③ ENDOTHELIAL DAMAGE

- Trauma / surgery
- smoking, HTN
- IV Drug use

SYMPTOMS:

- **Edema** in the lower extremity
- **Tenderness** or cramping in one leg
- **Warm to touch**, erythematous
- Bumpy / knotty feeling

DIAGNOSTICS:

1. **Ultrasound**
2. **D-Dimer** → protein fragment made when blood clots
   ↑ clotting = ↑ D-Dimer = **BAD**

TREATMENT:

PREVENTATIVE:

- **Do not** sit for too long → walk around
  Bed rest → Flex + Extend legs
- Keep legs **raised** while at rest
- **SCD's**, compression socks
- **Plenty of fluids**: Dehydration causes narrow vessels
- Exercise, No smoking
- Blood thinners, Lovenox

ACTIVE DVT:

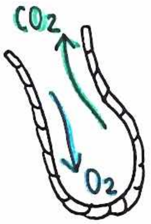
- **Bed rest**, measure or mark the swelling
- Anticoagulants – **does not dissolve** clot!
  – Will keep existing clot from growing and prevent new ones
  Heparin
  Warfarin
  watch PTT / INR
- **Do not massage legs**
- compression socks
- **tPA: Clot buster!**
  High risk of bleeding

ACUTE RESPIRATORY DISTRESS SYNDROME

WHAT? The capillary membrane that surrounds the alveoli sac starts to **leak fluid INTO** the sac

› causes a decreased gas exchange → collapse of the sac + HYPOXEMIA → **organs begin to SUFFER**

CAUSES:



INDIRECT:

#1 cause: SEPSIS

- Burns, Pancreatitis
- Multiple blood tranfusions
- Drug overdose

DIRECT (direct damage to lungs)

- Pneumonia
- Aspiration, Drowning
- Inhalation injury
- Embolism

SYMPTOMS:

EARLY: Barely Noticable

- Random crackles, dyspnea
- ↑RR, ↓O_2, ↓CO_2 → Respiratory Alkalosis
- IF PNA → cough, fever

LATE:

- severe difficulty breathing - **retractions**
- Refractory Hypoxemia, crackles
- Mental status change, ↑HR

STAGES:

① EXUDATIVE STAGE (24hr after injury)

1. Protein rich fluid leaks into the sac
   - Water follows protein = Pulmonary **EDEMA**
2. Pulmonary edema damages surfactant.
3. ↓ surface tension → collapse (Atelectasis)
4. ↓ O_2 (Hypoxemia)
5. Production of **HYALINE MEMBRANE**
   - lungs less elastic, ↓ lung compliance

HALLMARK SIGN: REFRACTORY HYPOXEMIA
(O_2 sat does not improve with O_2)

② PROLIFERATIVE STAGE (14days after injury)

- "Proliferate" = Repairing structures and fluid → Lungs are trying to help but causing more damage

1. lung tissue = dense + fiborous
2. ↓ lung compliance, worsened hypoxemia

③ FIBROTIC STAGE (≈3WK after injury)

1. Fibrosis of lung tissue
2. Major lung damage

POOR PROGNOSIS :(

TREATMENT: MAINTAIN AIRWAY

1. **Mechanical ventilation with PEEP** → ADDING pressure to keep lungs open + ↑O_2
   (10-20mmHg = very high due to ↓lung compliance + ↓ surfactant)
   WATCH FOR: Hyperinflation (TOO MUCH PRESSURE)
   - Pneumothorax, SubQ emphysema
2. **Prone Position**: ↑O_2 without having to ↑O_2 concentration
3. **ROOT CAUSE: INFLAMMATION**
   - corticosteroids / Abx
4. Watch UOP, BP, mental status

VENTILATOR BASICS

WHAT'S IT FOR? When the respiratory system is **FAILING**

1. Negative Pressure ventilation **AKA** Normal Breathing
2. Positive Pressure Ventilation → **ADDING (+) PRESSURE** into the airway

VENTILATOR BASICS:

1. **FiO_2** = Fraction of inspired oxygen → How much oxygen we are giving
   GOAL: As close to Room Air **(21%)** as possible **(Higher FiO_2 = sicker patient)**
2. **PEEP** = Positive End Expiratory Pressure
   The amount of air pressure in the alveoli at the **END** of expiration
   GOAL: Keep the alveoli open = more surface area for gas exchange } ↑O_2 w/o ↑FiO_2

VENTILATOR MODES:

MOST SUPPORT

1. **Volume cycle ventilation** → When a **PRESET volume** is reached, the inspiratory phase ends → **SHORT TERM**
   EXAMPLE: ASSIST CONTROL MODE → Preset RR, Tidal Volume, FiO_2, PEEP
   - Will deliver a set amount of breaths
   - Additional cycles can be triggered by the pt

   } **RISK: TOO MUCH SUPPORT**

   RISK: Barotrauma → No matter what, the vent will add fixed volume pressure, so it may burst alveoli

2. **Pressure cycle ventilation** → When a **PRESET** level is reached, the inspiratory phase ends **(look at preset pressure)**
   - More forgiving due to compliance of lungs = **↓RISK OF BAROTRAUMA**
   - like a balloon

LEAST SUPPORT

   EXAMPLE: PRESSURE SUPPORT VENTILATION (PSV)
   - The patient initiates the breath → vent delivers support
   - Preset pressure value; Pt regulates their OWN RR + Tidal volume

   EXAMPLE: BiPap
   - Combination of CPAP + Pressure support
   - Patient regulates their OWN RR + Tidal volume

NURSING CARE

- Warm, humidified Air!
- Infection control → suction + mouth care
- Always ensure placement of trach tube

NURSING CONSIDERATIONS:

1. If respiratory alkalosis occurs (hyperventilation), **ONLY** touch the RR setting → Decrease
   If respiratory acidosis → increase RR
2. **HIGH ALARM:** Airway pressure exceeds vent settings → Fix tube or fix settings
3. **LOW ALARM:** Lowest pressure has not been achieved to give a good breath

ABG INTERPRETATION

1

ASK YOURSELF:

1. Is this a respiratory or metabolic problem?
2. Do we have acidosis or alkalosis?
3. Do we have compensation?

	ACIDOSIS	NORMAL	ALKALOSIS
pH	<7.35	7.35-7.45	>7.45
CO_2	>45	35-45	<35
HCO_3	<22	22-26	>26

TIP: HCO_3 = BICARB, people 22-26 years old LOVE CARBS

2

ROME: For pH and CO_2/HCO_3

Respiratory
Opposite
Metabolic
Equal

$CO_2\uparrow$ $pH\downarrow$ = Respiratory **Acidosis**
$CO_2\downarrow$ $pH\uparrow$ = Respiratory **Alkalosis**
$HCO_3\downarrow$ $pH\downarrow$ = Metabolic **Acidosis**
$HCO_3\uparrow$ $pH\uparrow$ = Metabolic **Alkalosis**

KEY: If we are *only* determining respiratory/metabolic alkalosis/acidosis, we can *stop here.* If we need to determine compensation (situations when *both* CO2 and HCO3 are out of range), continue to Step 3.

3

COMPENSATION: Look at pH!

- Uncompensated = if CO_2 *or* HCO_3 are in range
  EX: pH: 7.30, CO_2: 50mmHg, HCO_3: 24mEq/L → the bicarbonate is *not* attempting to correct the respiratory acidosis issue at all
- Partially Compensated = if CO_2 *and* HCO_3 are both out of range
  EX: pH: 7.30, CO_2: 50mmHg, HCO_3: 30mEq/L → the bicarbonate is *partially* attempting to compensate the respiratory acidosis issue (pH level is acidic, and bicarb is basic → so we see the effort form bicarb here)
- Fully Compensated = if pH is within range!
  EX: pH: 7.35, CO_2: 50mmHg, HCO_3: 35mEq/L → the bicarbonate is *fully* compensating the respiratory acidosis issue (pH level is in range, which means that the high bicarbonate level is fully compensating the acidic pH level)

Metabolic Acidosis	**Metabolic Alkalosis**
Dx: DKA, shock, renal failure, diarrhea, starvation **S/S:** weakness, fatigue, headache, dysrhythmias, **Kussmaul respirations, SOB** **Tx:** , Bicarbonate, fluids; DKA: IV Insulin, normal saline, K+ & D50	**Dx:** vomiting, hypokalemia, suctioning, TPN food, Tums **S/S:** dizziness, decreased respirations, numbness in toes and fingers **Tx:** fluid and electrolyte repletion, decrease N/V
Respiratory Acidosis	**Respiratory Alkalosis**
Dx: Respiratory failure, COPD, hypoventilation, PNA, sedatives, coma, thoracic injury **S/S:** anxiety, confusion, headache, restless, blurry vision **Tx:** Bronchodilators, antibiotics, fluids, ventilation	**Dx:** Hyperventilation, increased altitude, PNA, anxiety attack, PTX, blood transfusion **S/S:** dizziness, dry mouth, numbness/tingling in fingers and toes **Tx:** Reventilate (paper bag), oxygen, antianxiety/sedative meds

CHEST TUBES

GOAL

Relieve the pressure from the pleural space (pneumothorax, hemothorax) *or* mediastinum space (after cardiac surgery) to improve respiratory/cardiac conditions

- Removal of air or fluid (blood)
- Allow the lung to re-expand *or* allow appropriate compression of the heart after surgery

NURSING CONSIDERATIONS

- Keep the drainage system *below* the insertion site
- Tubing must be free of kinks → Do NOT clamp or milk the chest tube
- Monitor for lung sounds, respiratory rate, dyspnea
- Assess for subcutaneous emphysema (crackling found on palpation of the skin)
- Encourage frequent moving, coughing, and deep breathing to facilitate movement of fluid

DISLODGED? Cover insertion site on 3 SIDES! Notify MD

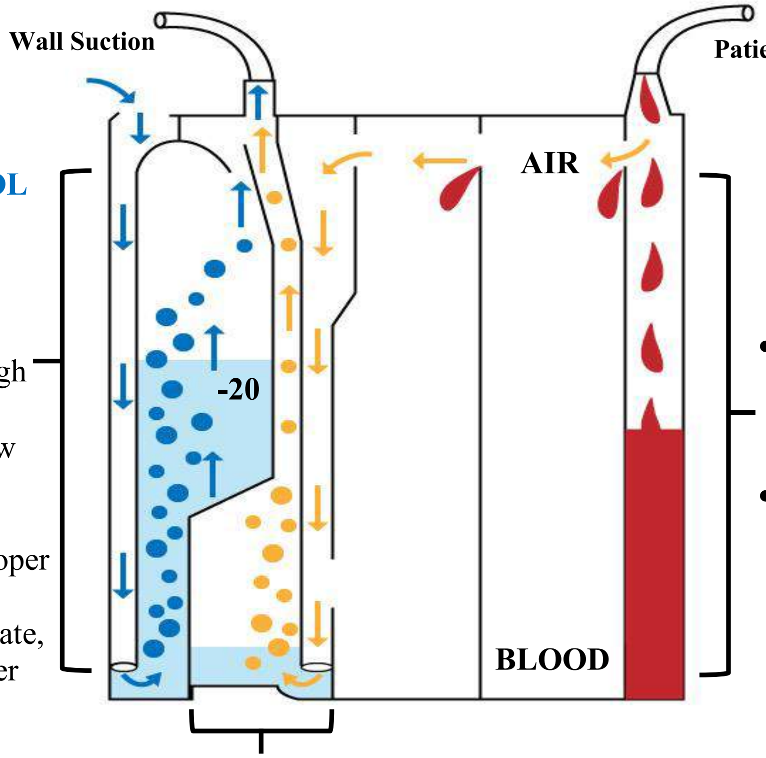
SYSTEM BREAK? Insert tubing in 1in sterile water!

SUCTION CONTROL CHAMBER

Controls the amount of suction imposed on the patient

- High water level → High suction
- Low water level → Low suction
- Continuous bubbling is OKAY → Indicates proper suction

NOTE: Water will evaporate, so we must check the water level and refill if too low (appx. 20cm for adults)



COLLECTION CHAMBER

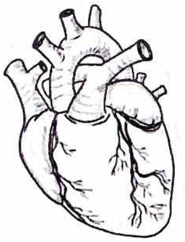
- Fluids that flow out of the patient → Should be NO more than 100mL (cc)/hr
- Note the color → Report excessively cloudy or unexpected bloody fluid

WATER SEAL CHAMBER

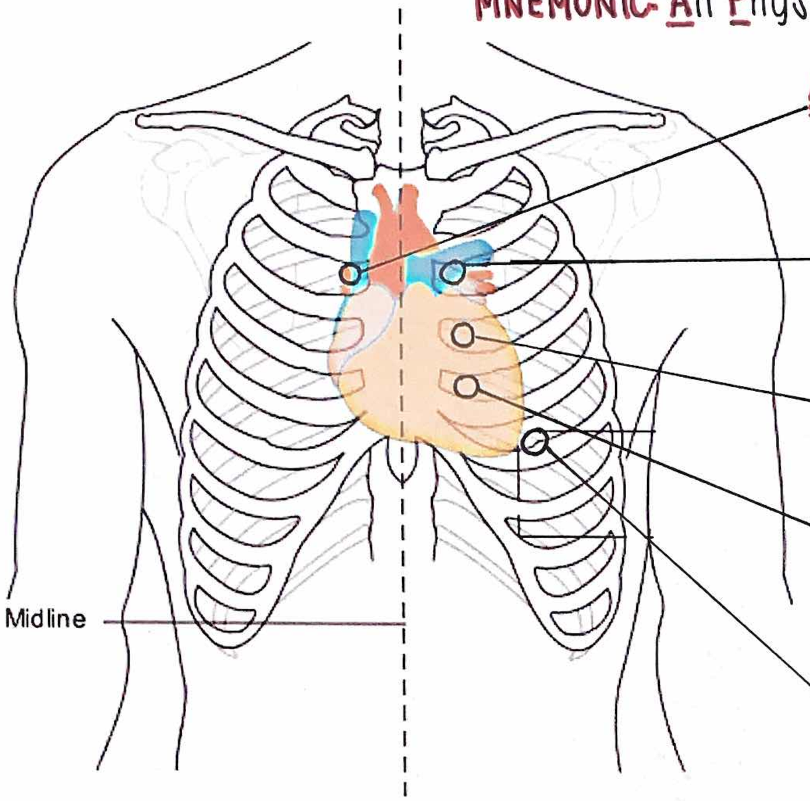
Allows air to be removed from the tube while preventing *outside* air from entering the lungs

**Connected to the collection chamber and allows air to pass down through a narrow channel and bubble out through the bottom of the water seal

- The water seal chamber will intermittently fluctuate as the patient breathes in and out
  - Inspiration → Increase; Expiration → Decrease
  - Tidaling with breathing is *OKAY* → Indicates breathing
  - Continuous bubbling is *NOT OKAY* → Indicates an air leak somewhere in the system
- No fluctuation? → Indicates the lung has re-expanded (YAY) *or* there is a kink in the system
- GREAT indicator of how the patient is progressing
  - The underwater system acts as a measuring tool for measuring intrathoracic pressure. When intrathoracic pressure changes, fluctuation in the water level are observed.

AUSCULTATING  SOUNDS

MNEMONIC: All Physicians Enjoy Taking Money



AORTIC: Right 2nd intercostal space
- S2 (DUB)
- A2 - closure of the aortic valve

PULMONIC: Left 2nd intercostal space
- S2 (DUB)
- P2 - closure of the pulmonic valve

ERB'S POINT: Left 3rd intercostal space
- S1 + S2 = line of separation between base and apex

TRICUSPID: Left 4th intercostal space
- S1 (LUB)
- closing of the tricuspid valve

MITRAL: Left 5th intercostal MID-CLAVICULAR
- S1 (LUB)
- closing of the mitral valve
- Point of maximal impulse!!

S_1 - beginning of systole
- closing of the tricuspid + mitral valve

S_2 - end of systole, beginning of diastole
- closure of Aortic (A_2) + pulmonic (P_2) valve

S_3 and S_4 = EXTRA ♥ sounds

SYSTOLE: ventricle pump = LUB
DIASTOLE: ventricle relax = DUB

S_3 heart sound: rapid rush of blood from the atrium to the ventricle as it starts relaxing
- LOW PITCH
- Early diastole
- May be a Normal Finding:
  - ATHLETE, Pregnancy, children
- May be an ABNORMAL Finding:
  - S3 = PE → pulmonary embolism
  - sign of systolic HF
  - cardiomyopathy

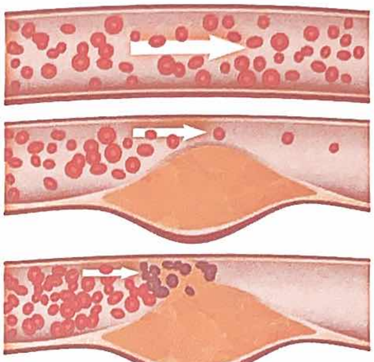
⇒ VENTRICULAR GALLOP

S_4 heart sound: ABNORMAL!!
sudden slowing of blood flow by the ventricle as the atrium contracts
- Low intensity sound
- May be a sign of diastolic HF or ♥ ischemia

⇓ AKA ARTERIAL GALLOP

ANGINA
STABLE AND UNSTABLE

WHAT? AKA CHEST PAIN → Narrowing of the coronary arteries that supply the heart with blood and oxygen = ↓ Blood flow + O_2 to the heart muscle



CAUSES:
Occurs in times of high demand for oxygen

- Exercise
- Exposure to cold (vasoconstriction)
- Emotional stress
- Eating a heavy meal (blood is being used for digestion instead)

RISK FACTORS:
- smoking, HTN
- HIGH CHOLESTEROL
- Poor Diabetes management
- sedentary lifestyle, obesity
- MEN: >45yo
  WOMEN: >55yo

DIAGNOSTIC TESTING:
1. coronary angiography → CT scan with dye to see occlusions
2. EKG's + Echocardiogram
3. LFT's, Lipid profile (cholesterol)
4. stress Test on the heart
5. Blood test to ensure it isnt an MI

SYMPTOMS:
CHEST PAIN → constricting pressure that radiates to the jaw, back, arms

- Depending on severity:
  - Nausea / Pallor, SOB
  - Diaphoresis
  - Upper GI discomfort

  ] Also signs of Myocardial infarction

TREATMENT:
1. immediate relief (Nitroglycerin)
   - dilates arteries to ↑ blood flow

   NTG Pill
   - stable Angina
   - 1 pill q5min (3 doses)
   - call 911 is sx persist after 1st Pill taken
   - HEAT/LIGHT SENSITIVE (dark bottle / NOT in car)
   - NO SILDENAFIL

   NTG Patch
   - unstable
   - rotate daily
   - clean, dry, shaved area
   - wear gloves!
2. surgical
   - PCI - stent in artery
   - CABG - reroute around artery
3. Beta blockers, CCB's, statins anticoagulants, lifestyle changes!

STABLE:
SAFE

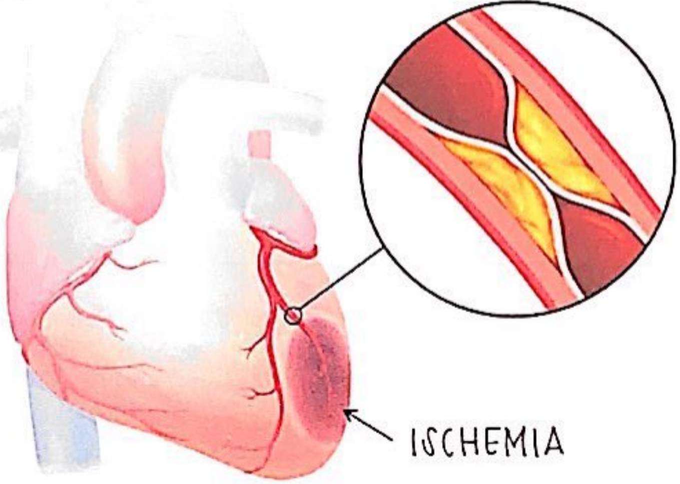
1. Occurs with exertion or stress
2. short duration <5MIN
3. symptoms relieved with Rest or Nitroglycerin
4. Predictable

UNSTABLE:
UNSAFE

1. Occurs with exertion, stress and rest
2. Long duration >30MIN
3. unreleived by rest or nitroglycerin
4. unpredictable

MYOCARDIAL INFARCTION
HEART ATTACK

WHAT? **complete blockage** in one or more arteries of the heart causing ↓ perfusion the heart muscle and ischemia



ROADMAP TO MI:

1. Coronary arteries become NARROWED by plaque buildup = ATHEROSCLEROSIS
2. ANGINA OCCURS
3. If plaque ruptures and thrombus forms we see total artery OCCLUSION = MI

SIGNS + SYMPTOMS:

\#1 SIGN: CHEST PAIN
> Left substernal, crushing, sudden, pressure

2. Jaw pain, Left arm pain
3. Heart Burn, Abdominal pain
4. SOB, Dyspnea, N/V, sweating, pallor

ATHEROSCLEROSIS CAUSE:

> stress, sex, stimulants (cocaine)
> Obesity, Diabetes, HTN, HDL
> smoking, Male gender, African American race — increased incidence of MI

DIAGNOSTICS:

1. Patient History / Check electrolytes, ABG's
2. **Always** get EKG for complaints of chest pain
   - ST Elevation = blockage + ischemia (No O_2)
   - ST DEPRESSION = partial blockage (low O_2)
3. Check **Troponin** → (+) Active MI
   (NML: 0–0.4) (−) more testing → stress test
   1. Exercise (stop if CP or ST elevation)
   2. Nonpharmacological = inject dye
   KEY: NPO 4hr before + after
   > **24-48hr** before: no smoking or caffeine

TREATMENT:

NOW

Morphine – ↓ pain / Relaxes ♡
Oxygen – ↑ O_2 to heart
Nitroglycerine – vasodilates
Aspirin – blood thinner
(Nitro – no –afil drugs!)

NEXT

1. Fibrinolytics (tPA)
   > CLOT BUSTER → Bleeding risk
   > NO new IVs, SUBQ, IM, ABG's
2. Percutaneous coronary intervention
   > place a stent in occluded artery
   > contrast dye KILLS KIDNEYS!

AFTER

1. Prevent / stabilize clot (Heparin IV)
2. ♡ Rest
   BB, CCB's, Nitro
3. No Ibuprofen
   Yes statins, ACE, ARBs

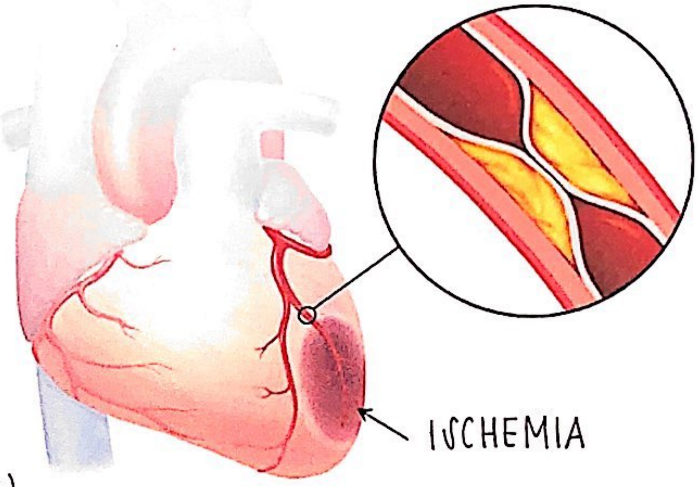
MYOCARDIAL INFARCTION

KEY THINGS

REMEMBER:

1. SILENT myocardial ischemia occurs more often in patients with DIABETES
   - Diabetes affects nerves = may not feel warning signs
2. Women may experience different signs: Jaw pain, SOB, backache, fatigue
3. No O_2 in muscle → cells release protein called Troponin (# 1 indicator)
4. If Tx isnt done immediately (Thrombolytics) PCI or CABG may be done

   CABG → coronary artery bypass graft
   - Takes an artery from another part of the body to REROUTE the blood supply around occlusion
     - 3-5 hospital stay recovery
     - Avoid lifting heavy objects
     - DO NOT soak wound



TEACH:

- ↓ salt and fluids to 2g/2L per day
- Avoid high sodium foods
- **Daily weights**
- ↓ stress, alcohol, caffeine, smoking cessation
- ↑ exercise - 30min / 5 days a week
- Resume sex **ONLY** when able to climb 2 flights of stairs with **NO SOB!**

COMPLICATIONS:

CARDIOGENIC SHOCK
- Watch for: Low BP, agitation, pale skin, low UOP
- Tx: ↑ BP with Epi, Norepi or Dopamine

DYSRHYTHMIAS — VFIB / VTACH
No Pulse – Defibrillate, NO synchronize

Yes Pulse – Cardioversion, YES synchronize

HEART FAILURE
- Watch for: ↑ weight gain, crackles, edema, JVD, S3 ♡ sound
- Tx: IV Diuretics (-IDE)

CARDIAC TAMPONADE
CARDIAC TAMPONADE → blood fills the sac around the heart → squishes it to death → WATCH: BEC'S TRIAD
- **B**ig JVD
- **E**xtremely ↓ BP
- **C**ant hear heart sounds

- Tx: Drain fluid with needle

HEMODYNAMIC PARAMETERS

Full Cardiac Cycle

Diastolic – Amount of pressure in the heart between beats
Normal: 60-80mmHg
Systolic – Maximum pressure the heart exerts while beating
Normal: 90-120mmHg

Stroke Volume (SV) – Volume of blood ejected from the ventricles per *stroke* (beat)
Normal: 60-120 mL

Cardiac Output (CO) – Total blood volume the heart pumps to the circulatory system per *minute*
Formula: CO = how much volume per beat (SV) x how many beats per minute (HR)
Normal: 4-8 L/min

Cardiac Index (CI) – Used to determine if cardiac output is sufficient for a patient's *size*
Formula: CO x TBSA (body surface area)
Normal: 2.5-4 L/min/m^2

Ejection Fraction (EF) – The percentage of blood forced out of the left ventricle with each beat
Normal: 50-75% → "The heart is pumping out 55% of what's is inside of the left ventricle with each beat"

Preload – Measure of *stretching/filling* pressure in the heart at the end of diastole
How do we measure? We measure using **central venous pressure (CVP)**
Normal CVP: 2-8mmHg

Conditions with *low* preload: Shock, hemorrhage, dehydration

- How do we *increase* preload?
  - Administration of IV fluids
  - Vasopressors → vasoconstriction → *increase* preload → *increase* SV → *increase* CO

Conditions with *high* preload: Heart failure

- How do we *decrease* preload?
  - Diuretics
  - Vasodilators (nitroglycerin) → vasodilation → *decrease* SV → *decrease* CO

Afterload – The pressure/resistance the heart has to pump against in order to eject blood
How do we measure? We measure **systemic vascular resistance (SVR)**
Formula: SVR = (MAP – CVP)/CO x 80
Normal SVR: 800-1200 dynes/sec/cm

Conditions with high SVR: Hypertension, aortic stenosis, pulmonary hypertension

- How do we *decrease* SVR in order to decrease afterload?
  - ACE/ARBs, vasodilators

Conditions with low SVR: Shock, sepsis

- How do we *increase* SVR?
  - Vasopressors/vasoconstrictors

Mean Arterial Pressure (MAP) – The average pressure in a patient's arteries during one cardiac cycle → indicates perfusion of organs and tissues
Formula: MAP = SBP + 2DBP/3
Normal: 70-100mmHg

Pulmonary Artery Wedge Pressure – an invasive hemodynamic device that is threaded throughout circulation until it reaches the pulmonary artery
"Wedged" into the pulmonary artery to offer precise function for the left side of the heart
Normal: 6-12 mmHg

LEFT + RIGHT HEART FAILURE

WHAT? The **inability** of the heart to provide tissues and other major organs an adequate amount of O_2 (in blood)

- **A chronic condition** with episodes of exacerbation

CAUSES:

Anything that has **damaged or weakened the heart** (or if the heart becomes **too stiff**)

- coronary artery disease / Myocardial infarction
- Hypertension
- Damaged heart valves (endocarditis)
- cardiomyopathy, myocarditis
- congenital heart defects
- Dysrhythmias

RISK FACTORS:

- HTN, CAD, DM
- sleep apnea
- congenital heart defect
- viruses
- alcohol / tobacco
- obesity
- dysrhythmias

LEFT SIDED V.S. RIGHT SIDED

LEFT SIDED (LEFT = LUNG)

- **Dyspnea, SOB**, Tachypnea
- cough, crackles, cyanosis
- **↓ O_2**, restless, confused
- Elevated PAWP

RIGHT SIDED (RIGHT = REST OF BODY)

- Blood pools in the body
- **Dependent edema**
- Ascites, Enlarged liver + spleen
- **JVD, ↑ weight**
- ↑ peripheral venous pressure

TREATMENT:

MEDICATIONS:

- **ACE / ARB's**, **Beta blockers** to **↓ pressure**
- **Diuretics** to release fluid buildup
- **Digoxin** to increase strength of contraction

SURGERY:

- **CABG**: reroute the pumping circulation
- valve replacement
- implantable cardioverters **(defibrillators)**
- ventricular assist device **(VAD)**
- **HEART TRANSPLANT**

CARE:

1. **LUNGS**: auscultate for crackles / wheezes
   - O_2, Fowlers position
2. **FLUID VOLUME**
   - fluid restriction
   - **low sodium**
   - **Daily weights** (2-3lb gain in 1 day → HCP)
3. **Educate** on meds and lifestyle factors

INFECTIVE ENDOCARDITIS

WHAT? Life threatening inflammation of the endocardium (lining of the heart chambers and valves)

PATHOPHYSIOLOGY:

1. Pathogen **enters the body** via invasive procedures, dental work, implantable devices, central lines, IV drug use, etc.
   PATHOGEN: Bacteria (most common) OR Fungi
2. Bacteria **enters the bloodstream** after entering the body
3. **Travel** through blood until it reaches the **heart**
4. Attaches to **heart valves** that have be weakened, damaged or replaced OR damaged heart tissue
5. **Clumps of germs** pile up and cause damage to the heart OR travel to distant organs to cause **damage**

RISK FACTORS:

- **Age >60**
- Artificial heart valves → Germs are more likely to attach
- **Implanted devices**
- Damaged heart valves (Rheumatic Fever, Previous Infection)
- **Poor Dental hygeine**
- Heart defects at birth
- Long term catheter use

SYMPTOMS:

- Fatigue / Malaise
- **Night sweats**
- **Pain with breathing** / SOB
- Enlarged spleen and liver (infection fighting organs)
- **Aching** in joints + muscles
- May have petechiae, Oslers node or Janeway lesions

TREATMENT:

- Collect blood cultures to identify bacteria
- **Antibiotics!** → **High dose** of abx may require hospitalization + **4WKS** of abx at home **TEACH: Finish Abx**
- Teach proper oral care
- **Notify Dentist of implanted devices** or history of Endocarditis
- **Monitor** for symptoms of heart failure
- **Surgery** → to treat persistant endocarditis or replace damaged heart valves

DISSEMINATED INTRAVASCULAR
COAGULATION

WHAT? Condition in which **blood clots** form throughout the body in excess
- The **overdrive in clotting** causes abnormal usage in platelets and clotting factors → **simultaneous bleeding** in other parts of the body

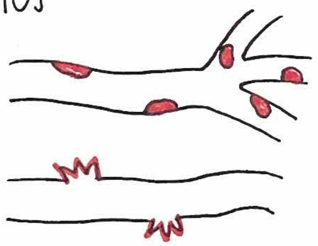
AKA: TOO MUCH AND TOO LITTLE CLOTTING

CAUSES:
- **Blood Transfusion reaction**
- Inflammation of the pancreas, liver disease
- Infection in the blood (sepsis, meningitis)
- **Pregnancy complication** → retained placenta

DIAGNOSE:
- **History** (Does not occur on its own)
- **PT/PTT** labs, CBC
- CMP to assess organ damage
- D-Dimer

SYMPTOMS:
- Bleeding from many sites of the body (Petichiae or Purpura)
- **Blood clotting**, **Bruising**, pain/redness at clotting sites
- Drop in blood pressure, change in behavior
- **Shortness of breath** → ↓ O_2 getting to major organs
- confusion, fever

SEVERE: HEMORRHAGE OR ORGAN DAMAGE



TREATMENT:
GOAL: control clotting/bleeding and treat underlying cause → will go away once treated

MEDICATIONS: Anticoagulants (to reduce clotting)

PLASMA TRANSFUSION: provide clotting factors or prevent bleeding

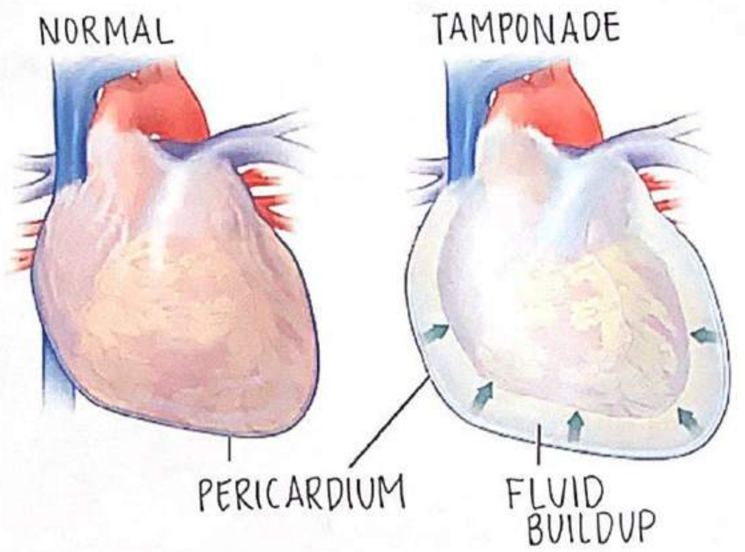
PLATELET TRANSFUSION: quickly raise platelet levels

- O_2 supplementation
- Watch vitals (O_2, BP, HR)
- Monitor mental status
- **Treat underlying cause** (Ex: stop transfusion, remove retained placenta)

CARDIAC TAMPONADE

WHAT? **serious condition** where blood or fluids **fill the sac** that encases the heart (pericardial sac)
› causes **extreme compression** of the heart in all four chambers
→ **difficult to pump effectively**

KEY: **Pericardial effusions** (fluid build up in the pericardial sac) with **enough fluid, pressure and force** can cause tamponade



CAUSES:

› **Pericarditis**, chronic kidney disease
› cancer, radiation to the chest
› inflammation **post MI**
› **Trauma** / Heart surgery

SIGNS + SYMPTOMS

› low blood pressure, **JVD**
› **Tachypnea**, tachycardia
› chest pain, shortness of breath
› anxiety and restless, fainting
› **MUFFLED HEART SOUNDS**

DIAGNOSIS:

1. **Echocardiogram** → looks fluid arount the heart
2. **EKG** → check the heart rhythm
3. **chest xray** → looking at chest anatomy
4. **CT/MRI**, **lung sounds muffled**

TREATMENT: MEDICAL EMERGENCY

1. **Pericardiocentesis** → needle and catheter used to drain fluid
2. **O_2, Fluids or Blood** (carefully) and medications to increase blood pressure
3. Keep patient on **EKG** monitor and continuous vitals
4. Assess breath sounds and heart sounds (**Muffled = BAD**)
5. Assess Neuro, cardio and lung status after centesis
6. Antibiotics if needed

PERIPHERAL

VASCULAR DISEASE

NARROW VEIN
aka vascular insufficiency

WHAT: a problem with the circulation of blood BACK to the heart → POOLING OF BLOOD

CAUSE:
1. smoking
2. uncontrolled diabetes
3. high cholesterol
4. high blood pressure

DX:
- Doppler US
- Arterial-Brachial Index

SYMPTOMS
- V = very big pulses = WARM legs
- E = edema → pooling
- I = irregularly shaped sores
- N = No sharp pain → Dull pain (we have O_2 so its not sharp)
- Y = yellow ankles

TREATMENT

"V" ELEVATE

1. Elevate the legs! Gravity will help push blood back to the heart
2. compression stockings
3. Antiplatelet meds → ASA, clopidogrel
4. cholesterol lowering meds → statins
5. surgery
6. stop smoking

WATCH: careful with temperatures
foot trauma
avoid crossing legs, caffeine
NO cold temp, YES hydrate!

ARTERIAL DISEASE

NARROW ARTERY

WHAT: narrow artery makes it difficult to pump O_2 blood to the body → ischemia and necrosis

CAUSE:
1. smoking
2. uncontrolled diabetes
3. high cholesterol
4. High BP, age >50

DX:
- Arterial-Brachial index

SYMPTOMS:
- A = absent pulses = SHINY, COOL legs
- R = ROUND, red sores
- T = toes/feet eschar (pale and dying)
- S = sharp, calf pain with elevation or exercise (This is an O_2 problem → ↓O_2 = ↑pain)

Priority S/S:
1. Pain unrelieved at rest
2. Parasthesia

TREATMENT

"A"

HANG

1. Hang the legs!
2. Antiplatelet and statin medications + vasodilators
3. Healthy lifestyle
4. surgery → CABG, endartectomy

← Watch all of these things too

VARIOUS CARDIAC BIOMARKERS

AND MEMORY TRICKS

CARDIAC TROPONIN:

TROPONIN: A protein released in the bloodstream → when heart muscle becomes damaged, the heart muscle fibers release troponin into the blood

- **RANGE:** 0 – 0.4 ng/mL
- indicates if a person is having or recently had an MI
- **MEMORY TRICK:** "You're on the **floor** if **Troponin** is >0.4"

CREATINE KINASE:

CK: An enzyme released in the bloodstream → when heart, brain, or skeletal muscle becomes damaged, the muscle fibers release CK in the blood

- **RANGE:** CK-MB (found in heart muscle): 0 – 5 ng/mL
- **MEMORY TRICK:** "Heart is oxygen deprived if CK-MB is >5"

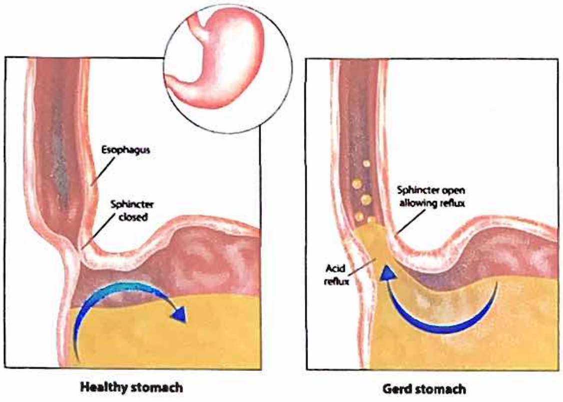
BNP: BRAIN NATRIURETIC PEPTIDE

BNP: A peptide released from the ventricular myocytes when the ventricles fill with too much fluid and STRETCH

- INDICATES HEART FAILURE
- **GOAL OF BNP RELEASE:** To dilate blood vessels to take pressure off of the heart
- **RANGE:** Normal: <100 pg/mL
  - Mild HF: 100 - 300
  - Moderate HF: 300 - 700
  - Severe HF: 700+
- **MEMORY TRICK:** ">100 BNP = The heart is failing miserably"

GASTROESOPHAGEAL REFLUX DISEASE (GERD)

WHAT IS IT?
A chronic condition where stomach contents flow backwards into the esophagus due to weak/damaged lower esophageal sphincter (LES)



PATHOPHYSIOLOGY:
Normal stomach - food is swallowed → peristalsis occurs to squeeze food into the stomach
LES relaxes, food enters, LES closes

IN GERD: impaired esophageal motility
① LES → weak due to: anticholinergics
- calcium channel blockers
- sedatives
- overeating/overweight
- smoking
- pregnancy (↑ pressure)
- fatty foods

② Esophageal mucosal lining - cells that line the esophagus get inflamed RISK: bleeding/esophageal cancer

③ stomach acid/contents - erode esophagus

DIAGNOSTICS:
1. ENDOSCOPY - will assess narrowing or ulcers formed
2. pH monitoring - measures amount of acid in the esophagus

SIGNS + SYMPTOMS:
MOST COMMON: HEARTBURN
- epigastric pain
- regurgitation
- dry cough worse at night / hoarseness
- Nausea
- difficulty swallowing
- lung/ear infections → fluid backtracts upwards

TREATMENT:
1. LIFESTYLE CHANGES: teach small meals
   - last meal 30min before bedtime
   - sit up 1 hr after meals
   - weight loss, smoking cessation
   - AVOID: fatty, EtOH, coffee, peppermint, acidic foods (citrus, tomatoes)

2. MEDICATION:
   - Antacids → interferes with many drugs!! GIVE alone, wait 1-2 hr before taking other meds
   - Histamine receptor blockers: ↓ histame, ↓ inflammation
   - PPI's - protect lining of stomach
   - Bethanechol, Metoclopramide

3. Fundoplication surgery - reinforce the LES by wrapping a portion of the stomach around the esophagus

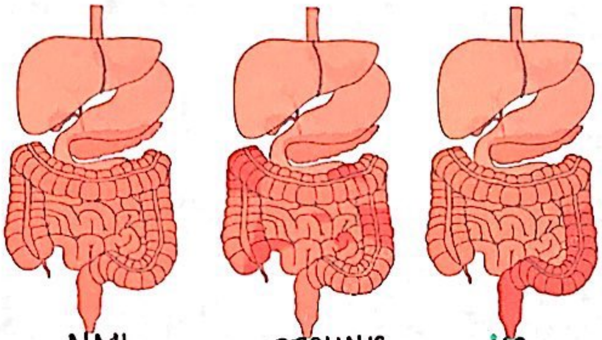
NURSING CARE:
1. Assess quality + frequency of pain to rule out heart attack
2. Assess for changes in cough and changes in voice
3. Ask if pain is aggrivated by foods/meds; if so, which ones
4. Watch for Risk aspiration
   - coughing
   - ↓ O_2 sat
   - ↑ RR

ULCERATIVE COLITIS (UC)

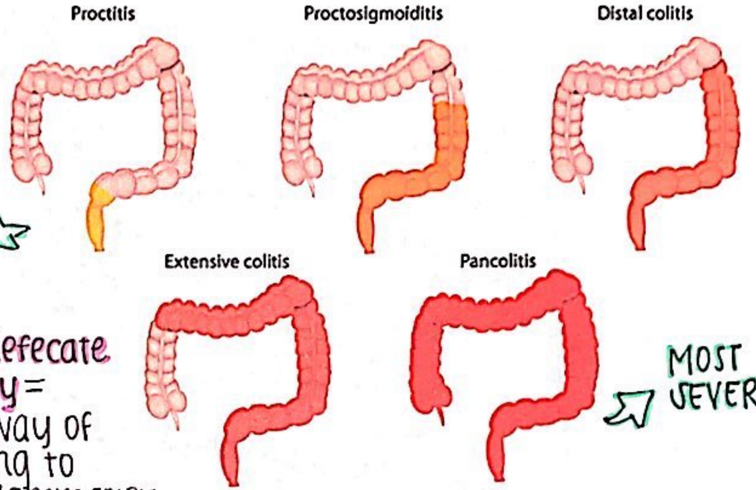
WHAT IS IT? A type of inflammatory bowel disease causing inflammation + ulceration in the INNERMOST lining of the colon + rectum ONLY

> NOT SCATTERED – continuous

> cause: environmental → ↑ fat, milk, NSAIDs, stress, illness (infection)
OR
Genetic



NML　CROHN'S　UC



LEAST SEVERE ↘

MOST SEVERE ↙

WHAT HAPPENS?

INFLAMMATION

1. cells of intestinal lining die = form ulcers that pus and bleed
2. intestine cant absorb water like normal
   ↓
   watery diarrhea that includes pus + blood as it passes over ulcers
3. urge to defecate frequently = body's way of emptying to help inflammation

KEY: continuous cycle of flare ups and remission
> ulcer sites Heal
> Lining stays damaged → may form polyps!!

SIGNS + SYMPTOMS:

THINK: "ULCERS"
- Urgent/Frequent need to defecate
- Loss of weight due to diarrhea
- Cramps
- Electrolyte imbalance / Elevated Temp
- Rectal bleeding
- Severe diarrhea (+ blood, pus, mucus)

CARE:
1. monitor bowel movement frequency, characteristics, bowel sounds
2. Encourage fluids
3. Daily weight
4. smoking cessation
5. Watch for Toxic megacolon:
   peritonitis s/s = abd pain, distention, ↑HR, ↑RR

SEVERE UC:

> Lead-pipe sign = large intestine starts to lose its form
  > will appear smooth (no Haustra :( )

> Repeated ulceration = rupture of bowels = peritonitis

> TOXIC MEGACOLON → large intestine dilates due to inflammation → unable to function properly → paralysis

TREATMENT + CARE:

1. only one cure: surgery ⟶ Proctocolectomy Ileoanal Anostmosis
2. Diet education: AVOID high fiber, nuts, veggies, fruits, dairy, spicy, high fat, gas causing foods
   > ENCOURAGE: Low fiber, High protein, high fluids
3. Medication
   1st line: antiinflammatories
   mild – sulfasalazine
   steroids – ↓ inflammation, NOT long term

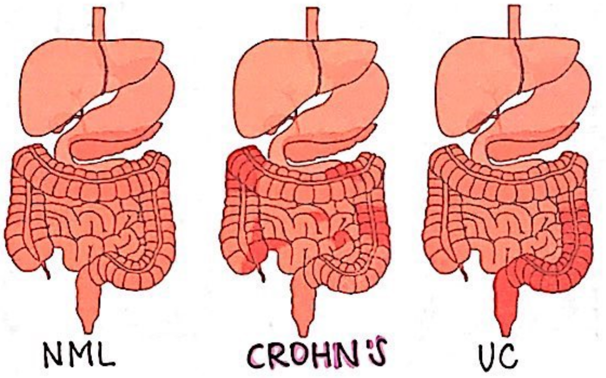
   2nd choice – immunosuppressors

   Also: Abx during flare ups
   Antidiarrheals

CROHN'S DISEASE

WHAT IS IT? A type of **inflammatory bowel disease** causing **inflammation + ulceration** in the **digestive tract**

- MAY affect __anywhere__ from the **mouth** to **Anus**
- SCATTERED patches – NOT CONTINUOUS "cobblestone appearance"
- Affects the ENTIRE bowel wall – all the way through to the serosa (outermost layer)



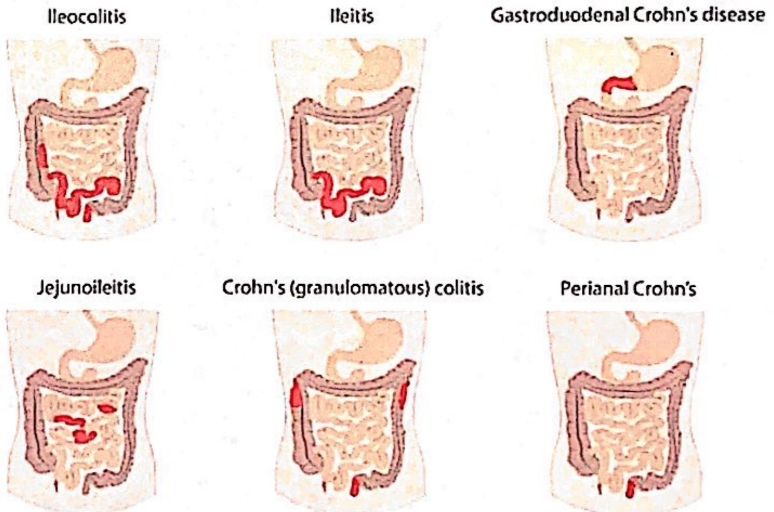
COMPLICATIONS:

1. Abscesses – form in the intestinal wall
2. Fistula – worsening of abscess may lead to a hollow hole
3. Malnourishment – if affecting the small intestine (site of absorption of nutrients)
4. Fissures – if affecting anal area – loss of integrity
5. Strictures
   - narrowing + intestinal blockage

SIGNS + SYMPTOMS

- Right lower abdominal pain
- Mouth or GI ulcers
- Diarrhea (sometimes with blood, pus, mucus)
- Loss of appetite / weight
- Fissures with anal bleeding
- abdominal bloating

TYPES



TREATMENT:
NO CURE

1. Diet education: AVOID – high fiber, nuts, veggies, fruits, dairy, spicy, high fat
   Gas causing foods!
   - ENCOURAGE: low fiber, high protein, high fluids
2. Medication depending on severity
   1st line: mild cases: sulfasalazine
   steroids – ↓ inflammation, NOT long term, ↑ infection risk
   2nd choice: immunosuppressors
   ↑ risk infection + cancer
   ↓ inflammation
   - Antibiotics during flares
   - antidiarrheals
3. Teach ostomy care if surgery occurs
4. Smoking cessation
5. In severe cases, TPN for malnourishment
   - Monitor weight
6. Monitor bowel movement frequency and characteristics, bowel sounds

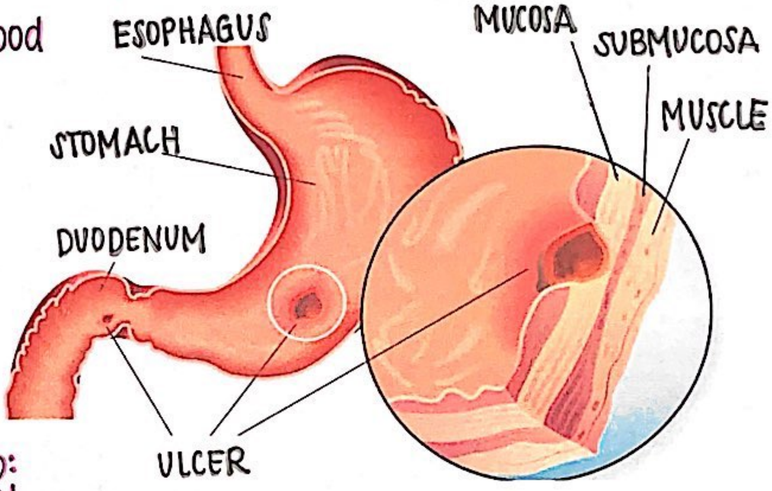
NO NSAIDS

PEPTIC ULCER DISEASE (PUD)

WHAT IS IT? Ulcerations formed in the upper GI tract that affect the **lining of the stomach, duodenum or esophagus**

PATHOPHYSIOLOGY: (in a NORMAL stomach)

Role of the stomach: mixes and grinds food
- makes acid + enzymes to break down food into liquid or paste
- ACID IS NORMAL in the stomach
- ACID IS NOT NORMAL in the esophagus or duodenum



KEY PLAYERS IN PUD:
1. MUCOSA
   - A. secretes bicarbonate → protects lining of stomach + netralize acid
   - B. parietal cells secrete hydrochloric acid
   - C. cheif cells secrete pepsinogen

   (B + C) MIXED: PEPSIN
2. SUBMUCOSA: tissues, nerves, vessels
   - pushes food down
3. SEROSA: outer layer, connects tissues to organs

BIG KEY: Prostaglandins stimulate mucus + bicarb secretion, AND controls acid amount secreted by parietal cells

SIGNS + SYMPTOMS:

MOST COMMON: indigestion or epigastric pain

GASTRIC
- Food makes it **worse**
- **DULL**, aching pain
- weight loss
- **vomiting** = coffee ground bright red

DUODENAL
- Food makes it **better**
- wake up in the night with pain (takes a while to get to this part of GI tract)
- normal weight
- **STOOL = Dark, tarry**

TREATMENT: { SEVERE: SURGICAL REPAIR

MEDICATIONS:
1. Proton pump inhibitors (Pantoprazole)
2. Antibiotics (if confirmed H. Pylori)
3. Bismuth (Pepto-Bismol)
4. H_2 blockers → ↓ H_2 release (zantac / Pepsid)
5. Antacids (Mag. Hydroxide, calcium carbonate sucralfate, carafate)

WHAT CAUSES PUD?

Things that reduce the protective mucosa layer:
1. **H. Pylori** – bacteria that attacks the mucosa
2. **NSAIDS** – inhibit prostaglandins → ↓ Bicarb = ↓ Defense = ↑ acid
3. **smoking**, EtOH, genetics, **stress**

{ **WHEN DAMAGED:** histamine release → parietal cells stimulated to release more HCL acid → destroys integrity

NURSING CARE:

1. Assess BM and bowel sounds / emesis
2. Monitor for GI bleed: stool / vomit
   ↑ HR, ↓ BP, PALE
   Bloating in abd
3. Dumping syndrome
   - lie down 30 MIN after eating
   - No fluids with meals
   - small, frequent meals
4. Teach DIET: avoid spicy, acidic, fried
   - no EtOH or caffeine
   - YES: low fiber

DIABETES TYPE 1 & 2

KEY PLAYERS:

1. **PANCREAS** → Beta cells produce and secrete insulin
2. **GLUCOSE** → AKA sugar = fuels cells in the body → will ONLY enter the cell with the help of insulin
3. **INSULIN** → secreted by Beta cells to attach to glucose so that it can be used to regulate blood sugar
4. **LIVER** → stores excess glucose as glycogen for a later time when your body needs it
5. **GLUCAGON** → helps ↑ blood glucose levels = when released, it causes the liver to release glycogen (glucose)

IN NORMAL BODY:

- A person has ↑BG → Pancreas releases **insulin** to attach to glucose to enter the cell
- A person has ↓BG → Pancreas releases **glucagon** to tell the liver to release glycogen = glucose

IN DIABETES:

TYPE 1: YOU HAVE NONE → Beta cells are not producing any insulin

- CAUSE: genetic or autoimmune reaction

TYPE 2: YOU HAVE FEW → Beta cells are producing few insulin receptors but they are not very responsive to glucose

- Become resistant to insulin → glucose hangs out in the body
- RISK: Hyperinsulinemia
- CAUSE: Lifestyle factors, obesity, poor diet, sedentary

GESTATIONAL: during pregnancy → Pancreas cant make enough insulin to meet demands

- goes away after birth

TREATMENT:

TYPE 1: INSULIN!

TYPE 2: DIET + EXERCISE → Then oral meds if needed

DIABETES TYPE 1 & 2

SIGNS + SYMPTOMS:

TYPE 1: Abrupt onset and more severe
- occurs in younger populations
- patients are thin and undernourished

POLYURIA: frequent urination
POLYDIPSIA: frequent thirst
POLYPHAGIA: Extreme hunger

+ fatigue, blurry vision, poor wound healing

TYPE 2: occurs in older populations >40YRS
- patients are frequently obese

GRADUAL onset → may experience same sx as Type 1 but most common is asymptomatic

COMPLICATIONS:

1. Hard, sticky vessels → increase risk of atherosclerosis, heart attack and stroke
2. Hypoglycemia (<70mg/dL)
   - CAUSE: too much insulin or oral medication
   - S/S: sweaty, clammy, confused, lightheaded

     THINK: "sweaty and clammy, give me candy"

   IF AWAKE → Ask to eat (sugar, candy, juice)

   IF UNCONSCIOUS → stab with D50 (sugar)
3. Eye damage → increased sugar in blood is damaging to eye vessels (cataracts, glaucoma, blind)

   Kidney damage → increased sugar will block + clog kidney vessels (kidney failure)
4. DKA: in TYPE 1, Ø insulin is made, so the body burns KETONES for energy = acid enters blood = acid/base imbal.

   HHS: in TYPE 2, little insulin, HIGH blood sugar without ketoacidosis

DIABETIC KETOACIDOSIS

ASSOCIATED WITH TYPE ONE

- Faster onset, easier to treat
- Typically in <45 YR OLDS

REMEMBER: TYPE 1, YOU HAVE NONE

→ NO insulin = NO sugar in the cell (↓ energy)

→ The body burns fat for energy = KETONES (Ketones are ACIDIC)

CAUSES:

- Improper insulin adherance
- infection (sepsis)
- Acute illness / sickness
- stress

SIGNS + SYMPTOMS:

- HIGH sugar (250-500+)
- KETONES + ACIDOSIS <7.35
- DRY body = dehydrated
- KUSSMAUL RESPIRATIONS → rapid, fruity breath
- Abdominal Pain

TREATMENT:

1. ALWAYS treat DEHYDRATION FIRST! → 0.9% NS
2. Then, slowly lower blood sugar →
   - OVER 250: IV Regular insulin only
     KEY: Add K+ during IV insulin
   - Below 200 or if Ketones resolve: SUB Q insulin + IV D5W
3. Hourly BG checks + ♡ monitor

HYPEROSMOLAR HYPERGLYCEMIC STATE

- AKA HHS, ASSOCIATED WITH TYPE TWO
- slower onset, harder to treat
- Typically >40 YRS OLD

REMEMBER: TYPE 2, YOU HAVE FEW

→ Few insulin receptors = Few sugars in the cell

→ NO KETONES (not burning fat)

CAUSES:

- unmanaged diabetes
- infection (sepsis)
- Acute illness / sickness
- stroke, impaired kidney function

SIGNS + SYMPTOMS:

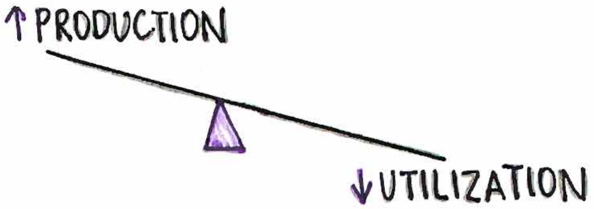
- HIGH sugar (600+)
- EXTREME Dehydration
- Neurologic symptoms (confusion)

↳ NO Ketones, Kussmaul or Abd pain

TREATMENT:

1. ALWAYS Treat DEHYDRATION FIRST → 0.9% NS
2. Then: slowly stabilize blood sugar → IV Regular insulin, then titrate with SUB Q insulin + IV D5W
3. Hourly BG checks
4. Assess Rehydration: stable BP; Pink skin, warm temp, urine output >30 mL/hr

HYPERGLYCEMIA



CAUSES:

① **Metabolic Response** to acute illness or injury (**Key: ↑ stress = ↑ glucose**)
Ex: MI, stroke, surgery, Trauma, sepsis, Pain

② **Skipping** or not using enough insulin or meds

③ **Inactive lifestyle**

④ **Diabetes** → inadequate uptake of glucose → TYPE 1 / TYPE 2

DX:

1. serum BG test (fasting)
2. Heme A1C Test for DM
   >6.5% = DM

SIGNS + SYMPTOMS:

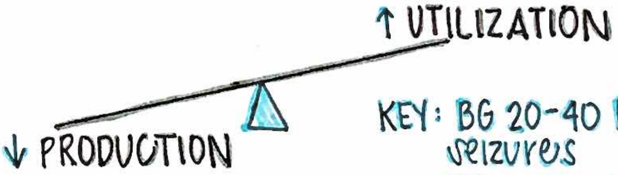
- Increased **thirst** or hunger
- Frequent **Urination**
- **Glycosuria**
- Headache, blurred vision, diplopia
- Numbness, Tingling, N/V

KEY: **NONDIABETIC:** fasting: 70-100
GOAL: <140 post meal
DIABETIC: fasting: 70-130
GOAL: <180 post meal

TREATMENT:

- Frequent **BG monitoring**
  → watch for s/s of DKA or HHS
- **Continuous IV insulin**
- Encourage exercise + ↑ fluids
- Educate on medication adherance

HYPOGLYCEMIA



KEY: BG 20-40 Risk of seizures
BG <20 = COMA

CAUSES:

① **Endogenous:** Tumors, metabolic errors, overuse of glucose, overproduction of insulin

② **Exogenous:** Too much insulin, oral antidiabetics, drugs

③ **Functional:** Excessive muscle use, Dumping syndrome, Hypermetabolic state

SIGNS + SYMPTOMS:

- **MILD:** Tachycardia, Tremors, Jittery, sweaty
  Excessive hunger, paresthesia
- **MOD/SEVERE:** CNS Response = Headache, drowsy, mood change, confused, seizure, coma

TREATMENT:

1. Mild Sx: PO snack with complex carbs → repeat 10min later
2. Glucagon IV, IM, subQ
3. IV Dextrose push
4. Monitor BG + s/s

ALL ABOUT INSULIN

RAPID-ACTING

1. Aspart
THINK: "Move your Ass" → Ass-part

2. Lispro
THINK: "Let's go!!" → Lispro

3. Glulisine
THINK: Glue dries fast

Onset: 15 MIN!
Peak: 30-90 minutes
Duration: 3-5 hours

SHORT-ACTING

AKA: Regular Insulin

KEY: This is the ONLY insulin type given IV route

- Can be given with NPH at the *same* time in the *same* syringe
- Can be given with long-acting at the *same* time in a *different* syringe

Onset: 30-60 minutes
Peak: 2-4 hours
Duration: 5-8 hours

INTERMEDIATE-ACTING

AKA: NPH

KEY: If given with regular insulin, draw up: **clear-to-cloudy**

THINK: R-N → Regular *before* NPH (clear before cloudy)

- Given 2x/day

Onset: 60-120 minutes
Peak: 4-12 hours
Duration: 14 hours (hence, given 2x/day)

LONG-ACTING

KEY: NO PEAK

- CAN'T BE MIXED WITH OTHER INSULIN!

1. Detrimir
THINK: "Lasts all year" → lasts a long time

2. Lantus
THINK: "Lantern" → lanterns burn for a long time

3. Glargine
THINK: "Large" → lasts for a large amount of time

Onset: 60-120 minutes
Peak: NO PEAK
Duration: 24 hours

WHEN DO YOU EAT?

1. Rapid-acting: Covers insulin needs for meals eaten at the *same* time of injection

2. Short-acting (Regular): Covers insulin needs for meals eaten within *30-60 minutes* of injection

3. Intermediate-acting (NPH): Covers insulin needs for *half* the day or overnight; typically given morning and night

4. Long-acting: Covers insulin needs for the *full* day; can be combined with other insulin but never mixed

RULES OF INSULIN

- Watch for signs and symptoms of hypoglycemia → shaky, clammy, pale, sweaty
  - THINK: "Cool and clammy, give me candy"
  - IF *AWAKE:* Ask the patient to eat (candy, juice, low fat milk)
  - IF *UNCONSCIOUS:* Stab with IV D50
- Regular insulin: ONLY insulin given IV
- NPH: If mixed, clear-to-cloudy (NPH is cloudy)
- Long-acting: Do not mix; NO PEAK
- Rotate injection sites → do not aspirate/massage
- **Always** increase insulin with: (glucose↑with any type of stress)
  - Stress
  - Sepsis
  - Sickness
  - Steroids

REMEMBER

TYPE 1: YOU HAVE NONE

- NO insulin being produced
- Patients will need insulin!

TYPE 2: THE PROBLEM IS YOU

- Encourage healthy diet and exercise
- Potential oral medication use
- Insulin (last resort)

INSULIN PUMP

- Give a steady dose of insulin for Type 1 DM
- Check BG 4x/day
- Push bolus at meals

HEPATITIS

INFLAMMATION OF THE LIVER CAUSED BY A VIRAL INFECTION

	A **A**cute ONLY	B **A**cute & **C**hronic "B" is in the middle of "A" and "C"	C Acute & Chronic 75-85% turn chronic	D Acute & Chronic "B" and "D" are **B**est bu**D**s	E **A**cute ONLY
Transmission	Fecal-Oral Route	**B**ody fluids, **B**lood, **B**irth, Sex	Body fluids, Blood Most Common: IV Drug Use	**B**ody fluids, **B**lood Most Common: middle east, Mediterranean, Europe	Fecal-Oral Route (uncooked meats, 3rd world countries)
Signs and Symptoms	• N/V/D • Abd pain • **Jaundice** → • Dark Urine • Joint Pain • Fever/Fatigue				
Diagnostic testing	Anti-HAV: antibodies detected (+) IgM – active infection (+) IgG = "Gone" – recovered or immune	Anti-HBs: previous/immune HBsAg – active infection	Acute <6mo Chronic: Anti-HCV: antibodies detected	Anti-HDV: antibodies detected	Anti-HEV: antibodies detected
Treatment	**Acute:** none Recover on own	**Acute:** none Recover on own **Chronic:** • Antivirals • Interferons (Peginterferon-alpha 2a)	**Acute:** Rare but treated like chronic **Chronic:** • Antivirals (ribavirin) in conjunction with an interferon	**Acute:** none Recover on own **Chronic:** • Antivirals • Interferons	**Acute:** none Recover on own
Prevention	**1.** HepA vaccine: pediatric schedule **2.** If exposed: PEP within 24hr **3.** Hand hygiene	**1.** HepB vaccine: pediatric schedule, jobs, adults with diabetes **2.** If exposed: PEP within 24 hours **3.** Hand hygiene **4.** Safe sex	**NO VACCINE OR PEP!** **1.** Hand hygiene **2.** Sharp precautions **3.** Blood and organ donor screening	**1.** HepB vaccine: occurs in the presence of B! **2.** Hand hygiene	**NO VACCINE!** **1.** Cook meat **2.** Hand hygiene

Function of the liver:

- Filter blood
- Metabolize drugs
- Bile production for fat
- Stores sugar, vitamins, minerals
- Coagulation
- Breaks ammonia into urea

Teach:

- **H:** hand hygiene
- **E:** eat low fat/high carbs
- **P:** personal hygiene products do NOT share
- Rest → for the liver
- Small meals
- Avoid alcohol, aspirin, acetaminophen, sedatives
- SubQ interferon injections

ACUTE KIDNEY FAILURE

WHAT? Kidneys suddenly lose their ability to filter blood (in a matter of days), causing waste products to build up in the body

- Potentially reversible ☺

CAUSE:

1. Loss of blood flow to the kidneys
   - MI, heart disease, Dehydration
   - Trauma, Blood loss, Burns
   - Liver Failure, NSAIDs use
2. Kidney damage
   - Blood clots, cholesterol deposits
   - glomerulonephritis
   - infection, meds hard on kidneys
   - Dyes (contrast), chemo, toxins (alcohol, cocaine)
3. Urine blockage
   - Bladder cancer, BPH
   - cervical / prostate cancer
   - kidney stones, nerve damage

TREATMENT:

- IV Fluids or Diuretics (depending on the cause)
- calcium gluconate OR sodium polystyrene sulfate to balance out potassium

  WATCH FOR: TOO HIGH K+ = arrythmias
  TOO LOW K+ muscle weakness
- Dialysis: remove toxins and excess fluid from blood

KIDNEY FUNCTION:

1. Filter waste from blood and excrete into urine
2. Regulate pH
3. Hormone production
4. Assist with blood pressure (RAAS) → regulate extracellular fluid

SIGNS + SYMPTOMS:

- Decreased urine output
- SOB and chest pain
- Nausea, fatigue, confusion
- Edema in lower limbs
- irregular HR, WORST: seizures

RISK FACTORS:

- increased age
- PAD, HTN, DM, HF
- Kidney / liver disease

ACUTE LIVER FAILURE

WHAT? Loss of liver function at a **rapid rate** (days to weeks), usually in patient with no history of liver disease or liver failure

CAUSE: Damage to the liver cells by:

- **HEPATITIS A, B, E** (most common)
- Acetaminophen overdose
- certian Toxins:
  - carbon Tetrachloride (material used in waxes / varneshes)
  - Amanita phalloides (wild, poisonious mushroom)
- cancer, heat stroke
- sepsis / septic shock

SIGNS + SYMPTOMS:

- **Jaundice!**
- Pain in **upper right quadrant**
- **Ascites**, N/V, fatigue
- confusion, tremors
- Musty, sweet breath

TREATMENT:

DEPENDS ON THE CAUSE:

- Acetylcysteine (for acetaminophen overdose)
- Diuretics to ↓ cerebral edema
- screen for infections → Medications
- **Liver Transplant**
- Medications to reduce risk of bleeding

LIVER FUNCTION:

1. Production of bile for fat
2. Metabolize drugs / filter toxins
3. Excrete bilirubin, cholesterol
4. Produce clotting factors
5. Breaks ammonia → urea
6. stores glucose

COMPLICATIONS:

- **Excessive bleeding** → GI Bleed
- ↑ Risk of infection
- Kidney Failure
- **Neurologic s/s** → high amounts of **ammonia** in the blood are toxic to the brain

DIAGNOSTIC:

- Blood Testing **(PT/PTT)** – Assess clotting factors
- imaging **(CT/MRI)**
- ultrasound
- **Liver biopsy**

OSTEOARTHRITIS

WHAT: Deterioration of the **articular cartilage** (cartilage between bones) that affects **weight bearing joints**

{ UNSYMMETRICAL

Risk factors:

1. Old age >40 → wear and tear
2. Repeated injuries
3. overweight
4. Manual Labor

SYMPTOMS:

- Joint pain → HARD + BONY
- Bone spurs (Heberden / Bouchard)
- stiffness → <30min; worse at end of the day
- Grating + clicking sound
- ONLY JOINTS

NO:
1. inflammation
2. Redness
3. Warmth

TESTING:

1. **Patient S/S** ; **Rule out** other arthritis
2. **X-ray** (only shows bone) but will show ↓ joint space / ↓ bone integrity

RHEUMATOID ARTHRITIS

WHAT: The immune system attacks **synovium** (connective tissue within the joint) that affects **MOSTLY** wrists, fingers, elbows

- can also be systemic (fever, anemia)

{ SYMMETRICAL

Cause: UNKNOWN → Tends to affect **woman > men** ; any age **20-60**

SYMPTOMS:

- INFLAMMATION!
- stiffness >30 min
- soft, warm joints
- SYSTEMIC sx (fever)

YES:
1. inflammation
2. Warmth
3. Redness

SYSTEMIC!

TESTING:

1. (+) Rheumatoid Factor
2. ↑ Erythrocyte sedimentation
3. (+) C-reactive protein
4. **X-ray** joint deterioration

NO CURE

Management (Osteoarthritis)
1. Realignment
2. Lose weight
3. Topical cream

Both:
Exercise
NSAIDs
Tylenol
Rest joints

Management (Rheumatoid Arthritis)
1. Synovialectomy
2. Arthrodesis (joint fusion)
3. Steroids

MUSCULAR DYSTROPHY

An inherited disease that **damages** and **weakens muscles** over time → changes in muscle and strength. This is caused by a genetic mutation in **DYSTROPHIN**. **No nerve damage!**

DUCHENNE

Dystrophin gene: **ABSENT** or **nonfunctional**

ONSET: <5YR OLD → more severe!

① **Short Term:** muscle regeneration (grow muscle fibers of diff. sizes) = NORMAL

② **Long term:** muscle atrophy (infiltrated by fat + fiber tissue) = WEAK

SYMPTOMS:

1. Proximal lower extremity and pelvis affected FIRST
2. Waddling gait
3. calf pseudohypertrophy (from fat/fiber tissue)
4. GOWERS SIGN → (hands on thighs to push to stand)
5. Walk on tiptoes, tripping/falling

LATER ON:
1. Wheelchair
2. Respiratory Failure
3. Scoliosis
4. dilated cardiomyopathy
5. Arrythmias

DX: ↑ creatine kinase, mutations, biopsy

TREATMENT:

1. Glucocorticoids → **SE: weight gain**
2. Physical Therapy
3. **NO CURE** :(

BECKER

Dystrophin gene: **MISHAPEN** and **partially functional**

ONSET: adolescence or early adulthood more mild!

SYMPTOMS:

1. Generalized weakness of hips, pelvis, thighs and shoulders FIRST
2. Waddling gait
3. calf pseudohypertrophy
4. walk on tiptoes, tripping/falling
5. NO RESPIRATORY SYMPTOMS

DX: ↑ creatine kinase, genetic testing, **Family history**

TREATMENT:

> same as **Duchenne** muscular dystrophy → **supportive care**

ISO, HYPO, AND HYPERTONIC FLUIDS

GOAL: Replace lost fluids from dehydration, shock, hemorrhage, burns, etc.
REMEMBER: The **WATER** goes where the **SALT** flows

ISOTONIC

EQUAL concentration of SOLVENT and SOLUTE

TYPES:
- 0.9% Normal saline
- 5% Dextrose in water (D5W)
- 5% Dextrose in .225% saline
- Lactated Ringers → Good for preggo moms and burns

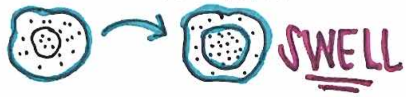
KEY: D5W turns into a hypo tonic solution (absorbs Dextrose)

USE: ↑ extracellular fluid
- Blood loss, Dehydration surgery, Burns

NURSES:
1. D5W is isotonic in the Bag, hypotonic in the body
2. LR → Burns + Preggo Mom
   - NOT liver impaired
   - NOT hyperkalemic

HYPOTONIC (LOW)

↓ concentration of SOLUTE in solution



TYPES:
- 0.45% NS (1/2 NS)
- 0.225% saline (1/4 NS)
- 0.33% saline (1/3 NS)

KEY: watch for cell lysis → TOO BIG they will burst
watch for depletion of circulatory system

USE: Rehydrate cells
- Dehydration
- DKA / HHS
- NOT for ↑ICP, burns or Trauma!

NURSES:
1. Give SLOWLY to prevent cellular edema
2. Risk of Hypovolemia Tachy, ↓BP, cellular edema / damage

HYPERTONIC (HIGH)

↑ concentration of SOLUTE in solution (SALTY)

TYPES:
- 3% saline
- 5% saline
- 10% Dextrose
- 5% Dextrose in 0.9% NS
- 5% Dextrose in 0.45% saline
- 5% Dextrose in LR

KEY: very hard on the vein
very concentrated → give via central line

USE: Hypovolemia
Hyponatremia
cerebral edema

TOO MUCH = PULMONARY EDEMA

NURSES:
1. Give slowly (hard on vein)
2. Watch fluid overload
   bounding pulses, JVD crackles, edema

KEY: Dextrose is sugar!
- DO NOT give to hyperglycemic patients

LACTATED RINGERS has potassium!
- DO NOT give to liver impaired or hyperkalemia

RECOGNIZING SHOCKS

LACK OF BLOOD FLOW THAT MAY LEAD TO ORGAN FAILURE

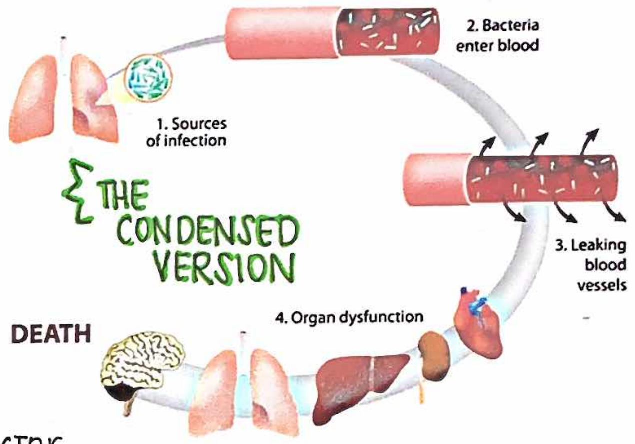
	Cardiogenic	Hypovolemic	Septic	Anaphylactic	Neurogenic
Etiology	Anything that causes damage to the heart will weaking the muscle of the heart from properly doing its job: • Myocardial infarction, arrhythmias, heart failure, blunt trauma, myocarditis	**Hemorrhage:** Postpartum, upper GI bleed, severe blunt trauma **Other:** Severe dehydration due to vomiting or diarrhea, burns	Response to an untreated infection • The end result of sepsis ☹	Histamine response due to exposure to an allergen • Via inhalation, injection, oral, or contact • Ex: bee sting, food allergy, drug reaction	Inability of the sympathetic nervous system to stimulate nerve impulses: • Spinal cord injury (T6 or higher), TBI, drugs, spinal anesthesia
Signs/Symptoms	• Hypotension • Tachycardia • Weak thready pulse • Cool, pale skin • Oliguria (<30mL/hr) • Slow capillary refill • Confusion/agitation Cardiogenic: WEAK heart; Hypovolemic: LOSS of fluid Cardiogenic: crackles and tachypnea, chest pain		• Hypotension • Tachycardia • Flushed, warm, skin • Vasodilation (blood volume is not diminished) Septic: fever, BP does not respond to fluids, increased respiratory rate Anaphylactic: bronchoconstriction, dyspnea, wheezing, swelling, itchy		• Hypotension • Bradycardia • Warm, dry extremities, cold core • Hypothermia • Loss of bladder control • Vasodilation (blood volume is not diminished)
Cardiac Output	• Decreased CO		• Increased CO (may fall later on)	• Decreased CO	
Systemic Vascular Resistance (SVR)	• Increased systemic vascular resistance (due to vasoconstriction)		• Decreased systemic vascular resistance (due to vasodilation)		
Treatment	• Immediate EKG • Supplemental O_2 • Pain control • Immediate reperfusion • BP meds: ○ Dopamine, Norepinephrine, Dobutamine, Pressors • Watch for fluid overload → lungs	• Trendelenburg • Fluids → NS or LR until blood can be matched • Monitor fluid overload (JVD, crackles, RR) • Monitor VS q15m • Supplemental O_2 • Monitor urine output • Pressors/N/D Meds	• Antibiotics FIRST within ONE hour of shock • Vasopressors • Fluid therapy • Supplemental O_2	• Establish airway! • Trendelenburg • Epinephrine • Albuterol • Antihistamines/steroids • Remove the allergen • Teach patient to carry Epi-pen	• Keep spine immobilized • IV fluids to increase CO (watch fluid overload) • Atropine to increase HR • Monitor urine output

ROADMAP TO SEPSIS AND SEPTIC SHOCK

WHAT IS IT?

A **life threatening** condition caused by the body's response to **infection**

STEPS TO SEPSIS:



{THE CONDENSED VERSION

1. **Infection enters** the bloodstream (bacteria, virus, fungi, etc.)
2. Immune system **identifies** that the body has become invaded
3. Immune system is **triggered** and releases:
   - A. **Inflammatory mediators** → ↑WBC
   - B. **Cytokines** → interleukins, tumor necrosis factor, histamine

SYSTEMIC INFLAMMATORY RESPONSE SYNDROME (SIRS) identified:

TWO or more of the following:
- Temperature >38°C or <36°C
- HR >90
- RR > 20 → body's attempt to lose heat
- WBC >12,000 or <4,000

4. **Confirm infection**
   > If documented or highly suspected **infection + SIRS** = **SEPSIS**
5. Immune system **release** causes:
   - > extreme **vasodilation**
   - > **capillary leak** = small blood capillaries separate and leak out blood and fluid = **SWELLING** in the interstitial tissue
   - > **clotting** = release of platelet aggrigation factor

Sepsis associated abnormalities ⇦ ⇦

1. hypotension (vasodilation)
2. hypovolemia
3. hypoperfusion = ↓O_2 to major organs = **ORGAN DYSFUNCTION**
4. Metabolic acidosis = may occur here or in shock

6. If **untreated** or **rapid sepsis**, may lead to **SEPTIC SHOCK**

criteria: sepsis symptoms (organ dysfunction, hypotension, hypoperfusion)
systolic BP **<90 DESPITE** giving fluids; MAP **<65**

MAY also see: Lactate **>4mmol**
Metabolic Acidosis → pH is too low
- > can't get rid of CO_2, lactic acid, and waste products
- > Kidneys aren't being perfused to work properly and make Bicarb to balance pH

multiple organ dysfunction syndrome (**MODS**)
- **ORGANS START TO FAIL** :(

SEPTIC SHOCK — KEY CONSIDERATIONS

REFRESHER: septic shock is a **distributive** type of shock **due to ↓SVR**

criteria: sepsis induced **hypotension**

- **sepsis symptoms** (organ dysfunction, hypotension, hypoperfusion)
- systolic **BP <90**

KEY: low BP <u>despite</u> giving fluids

RISK FACTORS:

- suppressed immune system
- **Age** → elderly and infants more prone
- patients with organ **transplant**
- **surgical procedure**
- indwelling device (catheter, central line)
- chronic illness

SIGNS + SYMPTOMS:

EARLY STAGE: "WARM"

1. Hyperdynamic **vasodilation**
2. **warm, flushed** skin
3. ↓BP, ↑HR, ↑RR, ↑CO
4. **Fever**, Restless, Anxiety

LATE STAGE: "COLD"

1. Hyperdynamic **constriction**
2. **cold, clammy** skin
3. Hypotension, MAP <65
4. ↑HR, ↑RR, ↓CO
5. Oliguria, **COMA**
6. Mental status **Δ's** → acidosis
7. Lactate **>4mmol**

TREATMENT:

ORGANS FAIL

① **GOLDEN RULE: Fluid therapy**
we **MUST** improve hypoperfusion so the organs **stay alive!**
KEY: Fluids **FIRST, THEN** vasopressors

GOAL: ↑SVR!!!

② **Decrease inflammation**
- steroids
- Drotrecogin Alfa

③ **Nutritional Therapy**
KEY: EARLY Enteral Nutrition = helps fight infection + stress ulcers

④ **O_2 Therapy** → supply those dying organs! = **RISK of ARDS if lungs fail**

⑤ **FIGHT INFECTION**
KEY: BEFORE anything, get **CULTURES**
START ABX within the <u>first hour</u>

REMEMBER: **Watch for:** signs of **organ dysfunction** ⇒ hypotension, Tachycardia, Oliguria, Tachypnea

- **Hemodynamic monitoring** for ♥ function
- Prevent **hyperglycemia** for Kidney function

DISASTER TRIAGE

Goal: provide the greatest benefit to the greatest number of casualties

TAG	DESCRIPTION	EXAMPLES
Red – Immediate	Patients with life-threatening injuries that are treatable within a minimum amount of time • Good chance of recovery if the patient is treated right away	• Compromise to ABC's • Spinal cord injuries • Burns over trunk/chest • Chest wounds/pain • Shock • Hemorrhage/severe bleeding • Trouble following commands
Yellow – Delayed	Treatment may be delayed for a limited period of time (hour) without significant mortality • Injuries are serious but the patient can wait to be seen until status declines	• Extensive open wounds • *Open* fractures • Abdominal pain/distention • Burns over limbs • Can follow commands
Green – Minor	Minor injuries that are not life-threatening and treatment can be delayed • Injuries are not *too* serious • Aka "walking wounded"	• Lacerations • Minor burns • *Closed* fractures • Sprained wrist • Minor bleeding
Black – Expectant	Patients with life-threatening injuries that are *so* extensive and severe that they are not expected to survive even with resuscitative efforts	• Unresponsive/stupor • Blunt trauma to the head/chest • Multiple penetrating wounds • Death

MNEMONIC: "RPM-30-2-CAN DO"

Respirations	RR <30 breaths/minute
Perfusion	Cap refill <2 seconds
Mental Status	Can follow commands
Patients with symptoms beyond the RPM guidelines belong in the "Red" category	

ELECTROLYTE RELATIONSHIPS

SODIUM / POTASSIUM = INVERSE

↑Na+ = ↓K+

CALCIUM / PHOSPHATE = INVERSE

↑Ca+ = ↓PO4

CALCIUM / VITAMIN D = SIMILAR

↑Ca+ = ↑Vit. D

MAGNESIUM / CALCIUM = SIMILAR

↑Mg = ↑Ca+

MAGNESIUM / POTASSIUM = SIMILAR

↓Mg = ↓K+

MAGNESIUM / PHOSPHATE = INVERSE

↓Mg = ↑PO4

INVERSE → Both electrolytes will go in opposite directions
Think: FRATERNAL TWINS

SIMILAR → Both electrolytes will go in the same direction
Think: IDENTICAL TWINS

VITAMIN D → The "big sister" to calcium. She helps calcium be absorbed

HYPERNATREMIA → OVER 145

CAUSES

- overproduction of Aldosterone
- ↑ Na+ intake (oral/IV)
- GI Tube feedings
- Hypertonic solutions in excess
- corticosteroids = Na+ excretion decreases
- Loss of fluids = too much free salt
  - Dehydrated, infection, diarrhea
- Diabetes insipidus

INTERVENTIONS

1. Restrict sodium intake
2. Patient safety (confused patient)
   - CALL LIGHT
3. IV isotonic or hypotonic solution (cells are salty and shrunken)
   - Give SLOWLY = RISK for cerebral edema
4. Educate on DIET

SIGNS + SYMPTOMS

BIG AND BLOATED

- Flushed skin
- Fever
- Agitated, confused
- ↑ fluid Retention = EDEMA
- ↓ urine output
- Dry mouth + skin

DIET

LIMIT

- canned foods
- Frozen dinner
- Fried food
- Tomato sauce
- cheese
- salad dressing
- salty rice cakes
- Pizza, hot dogs
- chips, lunch meat

SODIUM

RANGE: 135-145 mEq/L
GOAL: MAINTAIN BP + Blood Volume
MAINTAIN fluid balance
Regulated by Aldosterone

HYPONATREMIA → UNDER 135

CAUSES "NO Na+"

- ↑ Na+ excretion = Renal problems, NG suction, vomiting, sweating, diuretics, DI (↓ Aldosterone secretion)
- Overload of fluids = DILUTED
  - CHF, Hypotonic fluids, Liver Failure
- Na+ intake is insufficient = Diet/NPO
- ADH oversecretion = SIADH

INTERVENTIONS

1. Watch HR, RR, GI, Renal, Neuro
2. Administer IV Hypertonic Fluid → Hard on veins
3. Restrict Fluids / Diuretics — Risk: fluid overload
4. Antidiuretic Hormone antagonist (for SIADH)
   Declomycin = Do not give with food!
5. Patients on Lithium = watch drug levels
   ↓ Na+ = ↑ Lithium
6. DIET

SIGNS + SYMPTOMS

WEAK AND SHAKEY

- seizures / stupor
- Abdominal cramping
- confusion / lethargic / trouble concentrating
- ↓ DTR
- Loss of urine and appetite
- ↓ BP, ↓ Bowel sounds
- shallow respirations = LATE sign due to muscle weakness

DIET

ENCOURAGE

- salty foods in moderation

HYPERKALEMIA → OVER 5.0

CAUSES

- ACE Inhibitors (Retain K+)
- spironolactone
- NSAIDs
- Burns or trauma (K+ explodes out of cells that are lysed)
- Addisons = ↓ Aldosterone that regulates K+
- IV Fluids
- Renal impairment (Kidney disease or dialysis)

INTERVENTIONS

- IV sodium bicarbonate
- IV calcium gluconate "gives the muscles down"
- Albuterol
- Furosemide / Hydrochlorothiazide
- Dialysis
- sodium polycystrene sulfonate

WATCH EKG

SIGNS + SYMPTOMS

TIGHT + CONTRACTED

- irregular heartbeat = ST elevation, peak T wave
- ↓ BP, ↓ HR, severe VFib!
- Respiratory Failure
- Hyperactive bowel sounds = Diarrhea
- Brain strain = confusion
- BIG muscle weakness → cramping, ↓ DTR's tingling, burning, numbness

– DIET –

No salt substitute
No fruit
No green leafy veggies

POTASSIUM

RANGE: 3.5 - 5.0 mmol/L
GOAL: MANAGE heart + muscle function
MAINTAIN fluid balance + BP
REGULATED by kidneys

LIMIT

P - potatoes / pork
O - oranges
T - tomatoes
A - avocado
S - strawberries
S - spinach
fIsh
mUshrooms
Melons
+ BANANAS

HYPOKALEMIA → UNDER 3.5

CAUSES

- Dehydration
- Diuretics (Furosemide)
- Diarrhea / vomiting
- Drains (NG Tubes)
- severe acid imbalance
- HYPERaldosteronism
- corticosteroids → water retention
  insulin, albuterol → pushes K+ in the cell

INTERVENTIONS

1. Watch: EKG, respirations, GI, I & O's, BUN, creatinine
2. watch Mg+ levels → K+ and Mg+ are bff's
3. watch glucose, Ca+ and Na+ → Ca+, Na+, K+ are inverseley related
4. give oral supplement WITH FOOD
5. < 2.5 = potassium infusion = ONLY IV SLOWLY
   - watch for infiltration
6. HOLD Potassium wasting diuretics! → Why? ↓ K+ causes DIGOXIN TOXICITY

SIGNS + SYMPTOMS

LOW + SLOW

- irregular, thready pulse
- ↓ BP, ↓ HR, orthostatic hypotension
- ↓ Bowel sounds
- ↓ DTR, flaccid paralysis, weak, leg cramps
- confusion
- shallow respiration, diminished breath sounds
- EKG: ↓ ST segment, inverted T wave, prominent U wave

PEEING ALOT!

K+ sparing diuretics:

- spirno actone
- aldactone
- dyazide
- triamterine
- Maxide

HYPOCALCEMIA – UNDER 9.0

CAUSES

- Hypoparathyroidism
- Thyroidectomy
- Pancreatitis → releases calcium soaps + calciTONin
  "Puts a TON of calcium in the bone"
- Loop diuretics, laxatives, long
- term steroids, Phenytoin
- Phosphate enemas = ↑ Phos = ↓ Ca+ & Mg+
- GI wounds
- Chronic disease → celiac, crohns, CKD
- ↑ Phos, ↓ Vitamin D, ↓ magnesium

SIGNS + SYMPTOMS

WILD + CRAZY

- Prolonged QT/ST (severe: VTach)
- Heart Failure
- Trousseau sign = arm spasm with BP cuff
- Chvostek sign = smile when touching temporal lobe
- slow clotting factors = bleeding
- GI system going crazy = diarrhea
- Laryngospasms, dyspnea
- ALOC, seizures, confused

INTERVENTIONS

Watch EKG's

1. Give food high in calcium
2. calcium acetate (watch phos levels)
3. IV calcium
4. Oral calcium with vitamin D
5. Magnesium Hydroxide

CALCIUM

RANGE: 9 – 11
GOAL: affects bones, heart beats, and clotting factors
JOB: stabilize neuron excitability

Encourage

Dairy
sardines
canned salmon
Leafy greens
Tofu
Edamame

Restrict

HYPERCALCEMIA – OVER: 11.0

CAUSES

- Hyperparathyroidism
- Antacids with calcium (TUMS)
- Malignant cancer cells
- Low phosphate (Fraternal Twins)

SIGNS + SYMPTOMS

SLOW + SWOLLEN

- ↓ HR, ↓ RR, ↓ BP
- short QT, wide T wave, ♥ muscle spasm
- SOB, weak respirations
- Hypoactive GI = constipation
- Nausea, vomiting, ALOC
- Renal calculi
- ↓ DTR, ↓ muscle excitability
  if severe: muscle weakness
- Bone pain: excess calcium was taken from bone

INTERVENTIONS

1. Loop diuretics
2. Monitor EKG + urine output
3. IV normal saline for kidney stones
4. IV phosphate (Fraternal Twin)
5. calcium reabsorption inhibitors (calcitonin, Aspirin, NSAIDs)
6. Fall Risk
7. Last Resort = DIALYSIS
8. DIET

HYPOMAGNESEMIA → UNDER 1.5

CAUSES

- Excessive Alcohol = stops GI from absorbing Mg+
- Fluid loss → NG suction, N/V, Diuretics
- Antibiotics (Aminoglycosides)
- Pregnant momma's = risk for malnutrition

SIGNS + SYMPTOMS

MUSCLES GO WILD

- ↑HR, ↑RR (shallow respirations)
- Prolonged QT interval
- Depressed ST segment, inverted T wave
- Dyspnea
- Diarrhea
- ↑DTR's (CLONUS), numbness, tingling
- Confusion, insomnia, seizures

BAD: TORSADES DE POINTES OR VFIB

INTERVENTIONS

1. Assess swallowing (muscles)
2. IV magnesium sulfate
   ↳ give slowly and monitor labs
3. Assess respiratory rate
4. Assess reflexes → CLONUS is BAD
5. DIET!

MAGNESIUM

RANGE: 1.5 - 2.5 mEq/L
GOAL: muscle relaxation
MAINTAIN immune system, bones, BG

Encourage
Chocolate
Cauliflower
veggies
Avocados, Peas
Bananas, oranges
Milk, peanut butter
Pork, nuts
Restrict

HYPERMAGNESEMIA → OVER 2.5

CAUSES

- Diabetic Ketoacidosis
- Antacids with Mag+ (TUMS)
- Renal Failure
- Hyperkalemia - Addisons disease

SIGNS + SYMPTOMS

TOO RELAXED

- ↓BP, ↓RR, ↓HR
- Widened QRS, Prolonged PR interval
- Hypoactive bowel sounds
- ↓DTR's or absent
- Drowsy, Lethargic

BAD: COMA

INTERVENTIONS

1. IV Calcium gluconate
   (will ↓ muscle tension + tightness)
2. Monitor labs and DTR's
3. Hemodialysis = takes out excess Mg+
4. DIET!

HYPOPHOSPHATEMIA → UNDER 2.5

CAUSES

- Antacids – malabsorption
- Low vitamin D
- Hyperparathyroidism = ↑ Ca+ & ↓ phos
- Malignant cancer cells
  - ↳ kidneys waste phos = ↓ phos and bone softening
- severe malnutrition
- Hyperglycemia
- Excessive alcohol, burns
- Hypercalcemia

SIGNS + SYMPTOMS

BRITTLE + WEAK

- muscle weakness (hint: lungs)
- ↓ DTR's
- ↓ cardiac output
- Osteomalacia (Risk: fractures)
- immunosuppression = ↓ platelets, ↑ bleeding
- irritable, seizure Risk, confusion

INTERVENTIONS

1. Give oral phosphate / vit D
2. IV phosphate → ensure kidney function, watch calcium level, EKG
3. Fall Risk!
4. DIET!

PHOSPHATE

RANGE: 2.5 – 4.5 mg/dL
GOAL: build bones, teeth and muscles
STORED: mainly in bones
REGULATED: by kidneys + parathyroid

Encourage

Fish, chicken
Nuts
Pork
Whole grains
Beans

Restrict

HYPERPHOSPHATEMIA → OVER 4.5

CAUSES

- Fleet OR sodium-phosphate enema
  - Why? ↑ phosphate levels d/t kidneys cant filter
- Overuse of vitamin D
- Hypoparathyroidism = ↓ Ca+ & ↑ phos
- Insufficiency of kidneys (phos ⊘ excreted)
- Chemotherapy = kills good cells → electrolytes spill into blood

SIGNS + SYMPTOMS

SAME AS HYPOCALCEMIA

- Trousseau sign = arm spasm with BP cuff
- Chvostek sign = smile when touching temporal lobe
- Muscle spasms (TETANY) in calves + feet
- Hyperactive DTR's, Bone pain
- Laryngospasms
- confused / mental status changes

INTERVENTIONS

1. GIVE PHOSLO = calcium acetate (WITH FOOD!)
2. Avoid phosphate enemas
3. DIET!
4. Last resort = DIALYSIS

STILL HAVING A HARD TIME UNDERSTANDING ELECTROLYTES?

I have broken down each electrolyte by its "goal" and the corresponding signs and symptoms you will see. If you remember *one* thing about electrolytes, try to remember the goal of electrolyte – what effect does electrolyte have on the body? If you master this, then you will see that if you have *too much* or *too little* of each electrolyte, the signs and symptoms will simply be *too much* or *too little* of that goal. This will guide you to the signs and symptoms/food to recommend/restrict.

Sodium: 135-145 mEq/L

GOAL: Maintain blood pressure and blood volume via Aldosterone and RAAS

- **Too much:** Too much sodium, not enough water → Big and bloated symptoms
  - Dry mouth/thirst, dry skin
  - Increased fluid retention → Edema
  - Decreased urine output
  - Agitation/restless/confusion
  - Flushed skin/fever
- **Too little:** Not enough sodium compared to water → Weak and shaky
  - Mostly neurologic due to shift of water in brain cells causing edema
  - Headache, confusion, seizures, trouble concentrating
  - Abdominal cramping, decreased DTR's
  - Loss of urine and appetite
  - Shallow respirations = Late sign related to muscle weakness

Potassium: 3.5-5.0 mmol/L

GOAL: Heart and muscle contraction → making *strong* heart contractions

- **Too much**: Too tight and contracted = KEY: This can lead to weakness! Think about when you flex your muscles in the gym for too long, you become weak!
  - Irregular heartbeat → ST elevation, peak T wave
  - Decreased BP/Decreased HR
  - Respiratory failure
  - Hyperactive bowel sounds → Diarrhea
  - Confusion
  - Cramping and increased DTR's → Later on muscle weakness
- **Too little:** Too low and slow = KEY: This will still lead to weakness, so the signs and symptoms for hypokalemia and hyperkalemia are very similar
  - Irregular and thready pulse → ST depression, inverted T wave, prominent U wave
  - Decreased BP/Decreased HR
  - Decreased bowel sounds
  - Decreased DTR's, flaccid, paralysis, weakness, tingling, burning, numbness
  - Peeing a lot
  - Confusion
  - Shallow respirations, diminished breathing

Calcium: 9-11 mg/dL

GOAL: 3 B's: Bones, Beats, Blood → make strong bones, strong heart beats and clotting factors

- **Too much:** Swollen and slow (KEY: This is opposite of what we usually think!)

Think: Calcium's job is to stabilize *neuron* excitability. So, if we have too much stabilization, we will see *too much* control over neurons

  - Decreased HR, BP, RR
  - Spasms of the heart muscle
  - SOB, weak respirations
  - Hypoactive GI → Constipation
  - N/V
  - Decreased muscle excitability → Severe muscle weakness in major organs!
  - Bone pain → Excess calcium is taken from the bone
- **Too little:** Calcium is not there to stabilize the neuron channels
  - **Trousseau's sign** → Arm spasm with BP cuff
  - **Chvostek sign** → Smile when touching the temporal lobe
  - GI system is going crazy → Diarrhea, vomiting
  - Seizures/convulsions
  - Cardiac abnormalities → Ventricular tachycardia, prolonged QT/ST

Magnesium: 1.5-2.5 mEq/L

GOAL: Muscle relaxation

- **Too much:** Muscles are *too* relaxed (HINT: Think about muscles in major organs!)
  - Muscle weakness,
  - Vasodilation = Hypotension
  - Decreased DTR's
  - Respiratory arrest/Cardiac arrest
- **Too low: M**uscles are *too* excited!
  - Neuromuscular irritability
  - Tremors
  - Increase DTR's
  - Tachycardia
  - Confused/Seizure

NURSE: Watch magnesium levels through DTR's → Precursor for respiratory/cardiac arrest

Phosphate: 2.5-4.5 mg/dL

GOAL: Builds strong bone, strong teeth, and strong muscles

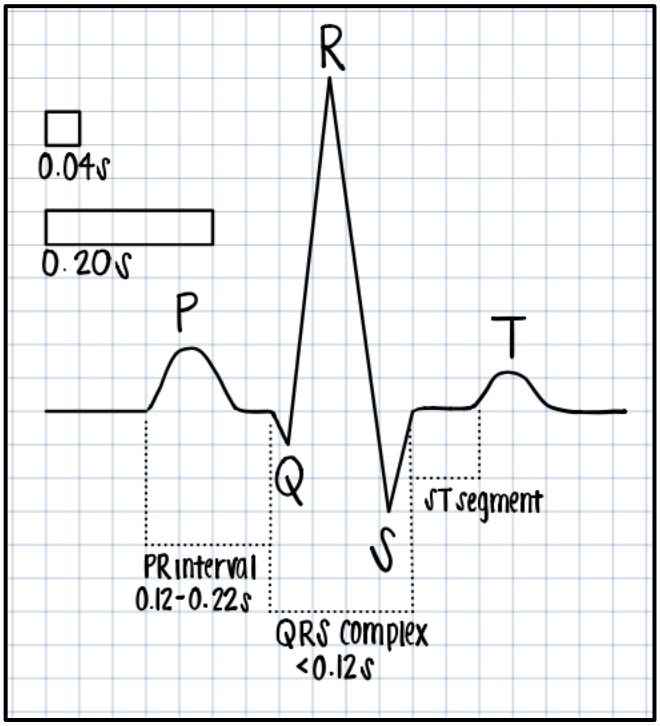
- **Too much: same as hypocalcemia** (fraternal twins)
  - If you remember one, you will automatically know the other. Yay!
- **Too little:** Brittle and weak!
  - Muscle weakness
    - Decreased ability to breathe
  - Decreased DTR's
  - Osteomalacia → Increased risk of bone fractures
  - Decreased cardiac output
  - Immunosuppression → Decreased platelets → Increased bleeding
  - Irritable, seizure, confusion

READING EKG'S

WHERE DO I BEGIN?

P-Wave: Atrial Depolarization
QRS Complex: Ventricle Depolarization
T-Wave: Ventricle Repolarization

Depolarization = Contract
Repolarization = Relax



6 STEPS TO IDENFITY RHYTHMS

1. Identify the Rate:
Normal: 60-100bpm
- 6 second strip → Count the R's x 10
  Key: Verify it is a 6-second strip!
- Big Box Method → Count the # of big boxes between R's / divide by 300

2. Identify the Rhythm: Distance between R waves
- Regular R-R interval = Normal Rhythm
- Irregular R-R interval = Some sort of arrythmia, let's keep going

3. Identify the P-wave:
- Is there a P wave? Yes
  Are they uniform? Yes] NML SINUS RHYTHM
- Is there a P wave? Yes/No
  Are they uniform? Yes/No] May indicate AFib or Aflutter

4. Measure PR Interval: Any PR interval >0.20 sec indicates heart block (delay in conduction)
Normal: 0.12-0.20sec

5. Measure QRS Complex: Do they all look alike?
Normal: 0.6-0.12sec
- WIDENED: May indicate PVC, BBB, drug toxicity, electrolyte imbalance
- NARROW: May indicate Wolff-Parkinson-White Syndrome

6. Interpret EKG findings! (+ Hallmark signs)

COMMON HALLMARK SIGNS
- Saw tooth appearance = Atrial Flutter
- Quivering = Atrial Fibrillation
- Mountain peaks = Ventricular Tachycardia
- ST elevation = may be heart attack or electrolyte imbalance
- ST depression = may be electrolyte imbalance

ELECTRICAL CONDUCTION SYSTEM OF THE HEART

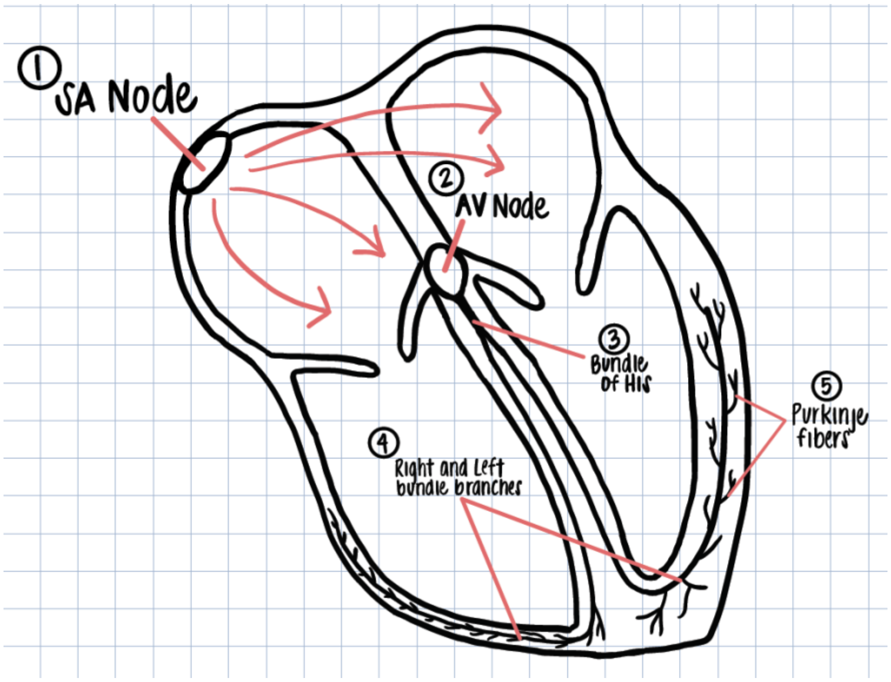
1. Impulse begins in the SA Node (Sinoatrial Node) AKA the "pacemaker" of the heart
- 60-100bpm
- This is our "P-wave"

2. Travels through internodal pathways to reach the AV Node (Atrioventricular Node) AKA the "gatekeeper" of the heart
- 40-60bpm

3. Travels through the Bundle of His

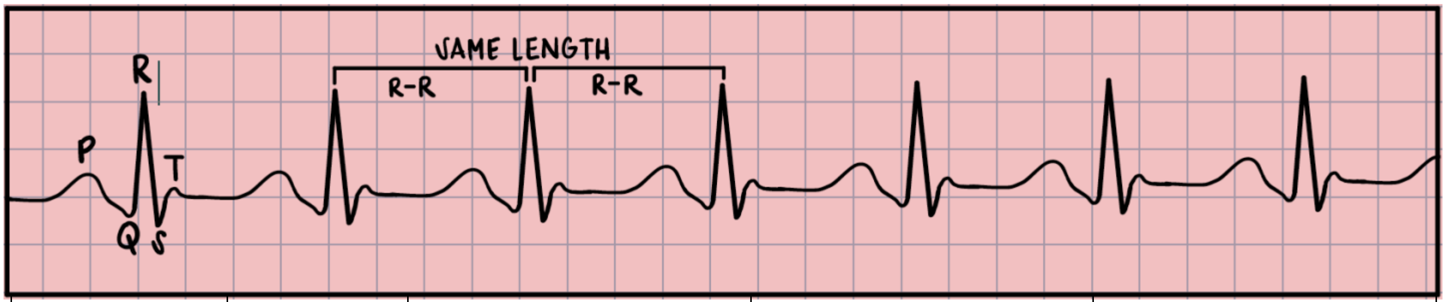
4. Branches off into the right and left bundle branches

5. Travels through the Purkinje fibers
- 20-40bpm



NORMAL SINUS RHYTHM

Rate: 60–100 bpm (Pictured: 70bpm)

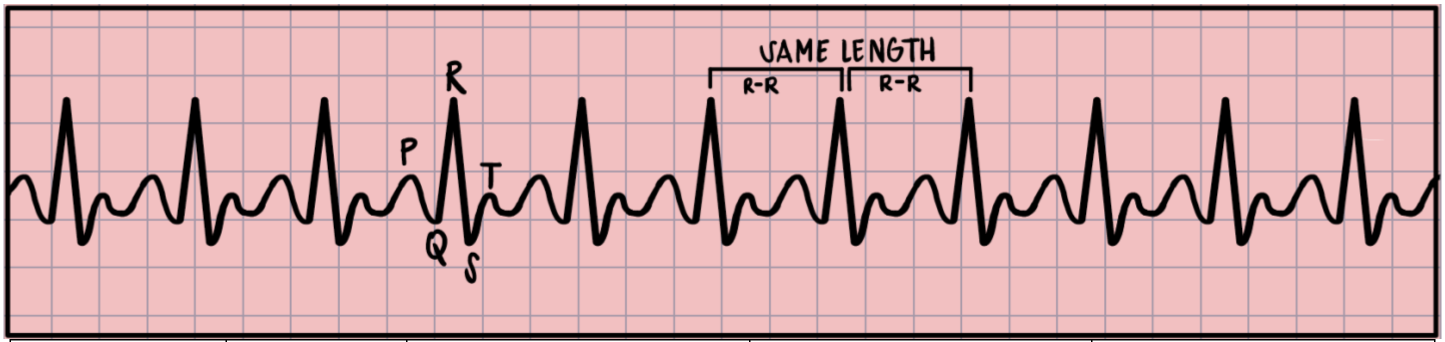


Heart Rate	Rhythm	P wave	PR Interval	QRS Complex
60-100bpm	Regular	Precedes every QRS complex	0.12-0.20 seconds; regular	<0.12 seconds; regular

Treatment:
None needed. Continue to monitor.

SINUS TACHYCARDIA

Rate: >100bpm (Pictured: 110bpm)



Heart Rate	Rhythm	P wave	PR Interval	QRS Complex
>100bpm	Regular	Precedes every QRS complex	0.12-0.20 seconds; regular	<0.12 seconds; regular

WHY DOES THIS HAPPEN?

- Exercise
- Hypertension
- Emotional distress, anxiety, fear
- Damage to the heart d/t heart disease
- Electrolyte imbalance
- Hyperthyroidism
- Severe bleeding/shock/hypovolemia
- Certain stimulants or medications (anticholinergics/adrenergics, caffeine, nicotine)

SIGNS AND SYMPTOMS

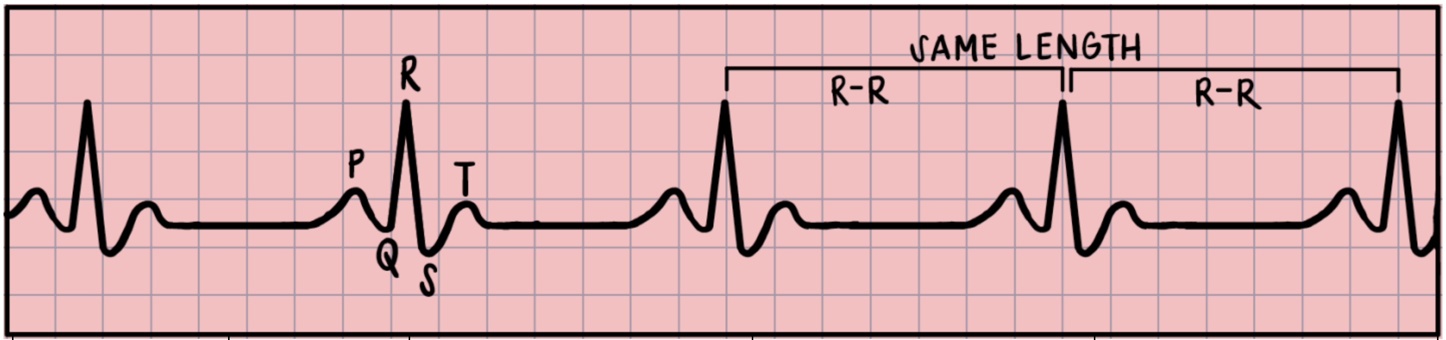
- Rapid pulse rate
- Sensation of rapid heartbeat (palpitations)
- Shortness of breath
- Dizziness, fainting (syncope), anxiety
- Chest pain; trouble exercising
- Headaches

HOW DO WE TREAT?

- Maintain airway, supplemental oxygen, obtain IV access, and monitor EKG
- *If unstable:* patient will have altered LOC, ischemia, shock or decreased BP
  - Synchronized Cardioversion
- *If QRS is wide: >0.12sec*
  - Antiarrhythmic: Adenosine, Amiodarone, Beta blocker, Procainamide
- Other: Carotid massage (vagal stimulation)

SINUS BRADYCARDIA

Rate: <60 bpm (Pictured: 50bpm)



Heart Rate	Rhythm	P wave	PR Interval	QRS Complex
<60bpm	Regular	Precedes every QRS complex	0.12-0.20 seconds; regular	<0.12 seconds; regular

WHY DOES THIS HAPPEN?

- **KEY:** This can be *completely normal* for certain people (athletes)
- Damage to the heart d/t heart disease
- Vagal stimulation
- Hypothermia, hypoglycemia
- Hypothyroidism
- Certain drugs or medications (cholinergics, adrenergic blockers, opioids)

SIGNS AND SYMPTOMS

- Slow pulse rate
- Near-fainting or fainting (syncope)
- Fatigue, dizziness, lightheadedness
- Shortness of breath
- Chest pain
- Confusion or trouble with memory
- Easily tired during physical activity

HOW DO WE TREAT?

KEY: Treatment is *only* necessary if we experience symptoms. We *do not* need to treat patients who have a baseline bradycardic rate (athletes)

*****If symptomatic:*** Patient will experience fatigue, dizziness, syncope

Anticholinergic Medications

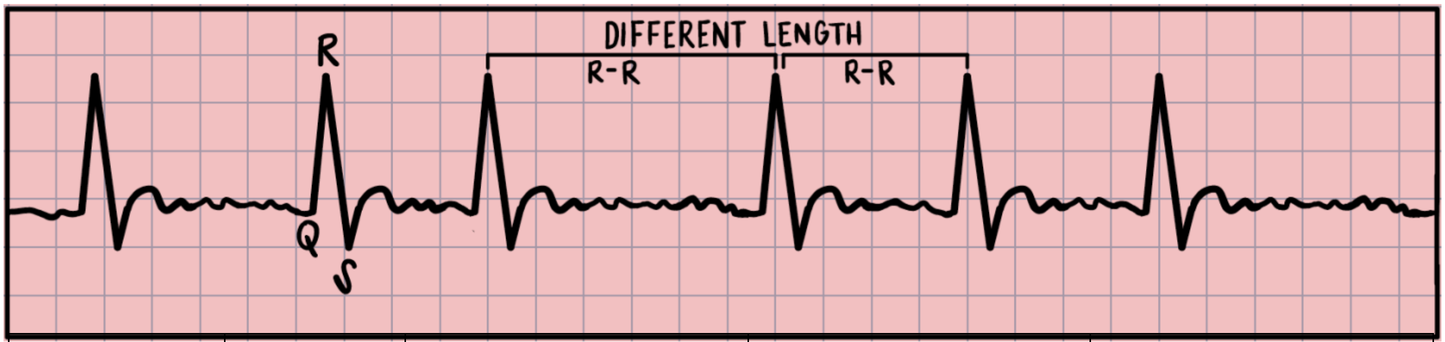
- Ex: Atropine – THINK: "pine" like pine tree → you climb a pine tree *up*wards
  - Dose: 0.5 mg IV to increase heart rate; can be repeated for up to 3mg

Transcutaneous pacing

- Will pace the heart to offer adequate number of beats to pump blood to major organs

ATRIAL FIBRILLATION

Rate: May vary



Heart Rate	Rhythm	P wave	PR Interval	QRS Complex
Atrial: 350-600 bpm **Ventricular**: 120-200 bpm	Irregular	Unidentifiable and not uniform (erratic)	Not measurable (due to P wave being hard to measure)	<0.12 seconds; regular

WHY DOES THIS HAPPEN?

When the two upper chambers of the heart experience chaotic electrical signals, which causes the upper chambers to *quiver*

- Hypertension, heart attack, CAD, heart failure
- Abnormal heart valves or congenital heart defects
- Certain medications, caffeine, tobacco or alcohol
- Chronic conditions: hyperthyroidism, metabolic syndrome, diabetes, lung disease
- History of heart surgery
- Viral infections
- Stress due to surgery or illness
- Sleep apnea

SIGNS AND SYMPTOMS

- **May not have symptoms** → This increases the risk of stroke, heart failure or other complications that may go unnoticed

If symptoms are experienced:

- Heart palpitations → racing, uncomfortable, irregular heartbeat felt in the chest
- Weakness, lightheadedness, dizziness
- Shortness of breath
- Chest pain
- Trouble exercising

May be:

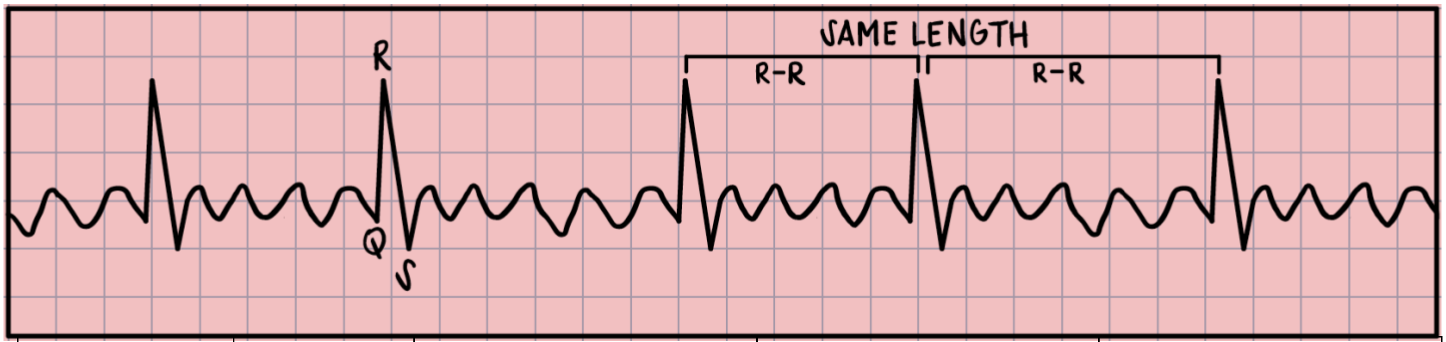
- Occasional (might go away on own)
- Persistent (treatment needed)
- Permanent (treatment needed)

HOW DO WE TREAT?

- **Reset the rhythm:** Pharmacological or electrical cardioversion
- **Control the rate:** Beta blockers, Digoxin, Calcium Channel Blockers
- **Prevent thromboembolism:** Anticoagulants (warfarin, rivaroxaban)
- **Maintain NSR:** Flecainide, Propafenone, Amiodarone, Sotalol
- **Other:** Lifestyle changes and treat the underlying cause

ATRIAL FLUTTER

Atrial Rate: 250–350 bpm



Heart Rate	Rhythm	P wave	PR Interval	QRS Complex
Atrial: 250-350 bpm **Ventricular**: often slower	Irregularly Regular	SAW TOOTH APPEARANCE; flutter (F waves) waves buries in QRS	Not measurable (due to P wave being hard to measure)	<0.12 seconds; regular

WHY DOES THIS HAPPEN?

Similar to atrial fibrillation but the *rhythm* in the atria is more organized and less chaotic compared to the appearance of atrial fibrillation. However, the *rate* of the atrium is still fast

- Hypertension, heart attack, CAD, heart failure, valve disorder
- Certain medications, caffeine, tobacco, or alcohol
- Chronic conditions: COPD, emphysema, sleep apnea
- History of heart surgery
- Obesity, Age >60

SIGNS AND SYMPTOMS

- **May not have symptoms** → This increases the risk of stroke, heart failure or other complications that may go unnoticed
- If symptoms are experienced, patients will see similar symptoms as atrial fibrillation

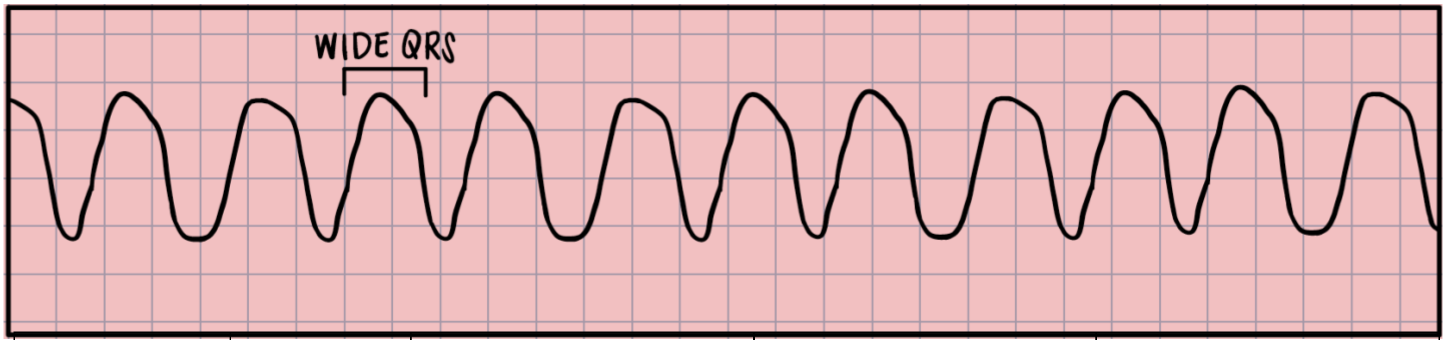
**Watch for symptoms of heart failure or blood clot!

HOW DO WE TREAT?

- **If unstable (ventricular rate is >150bpm) and symptomatic:** Immediate cardioversion
- **Control ventricular rate:** Beta blockers, calcium channel blockers (verapamil, diltiazem)
- **Maintain NSR:** Antiarrhythmics (amiodarone, sotalol), Cardiac ablation
- **Prevent thromboembolism:** Anticoagulants (warfarin, rivaroxaban)

VENTRICULAR TACHYCARDIA

Ventricular Rate: 100–250bpm



Heart Rate	Rhythm	P wave	PR Interval	QRS Complex
Ventricular: 100-250bpm	Regular	Unidentifiable (blurs into the QRS complex)	Not measurable (due to P wave being hard to measure)	Wide and bizarre; >0.12 seconds MOUNTAIN PEAKS

WHY DOES THIS HAPPEN?

- Myocardial infarction causing damage to heart structure
- CAD, mitral valve prolapse causing poor blood flow to the heart
- Aneurysm, cocaine, methamphetamine
- Hyperkalemia/hypokalemia
- Pulmonary embolism, digitalis toxicity

SIGNS AND SYMPTOMS

- Sensation of rapid heartbeat (palpitations)
- Chest pain
- Dizziness, lightheadedness
- Shortness of breath or dyspnea

Sustained Ventricular Tachycardia:

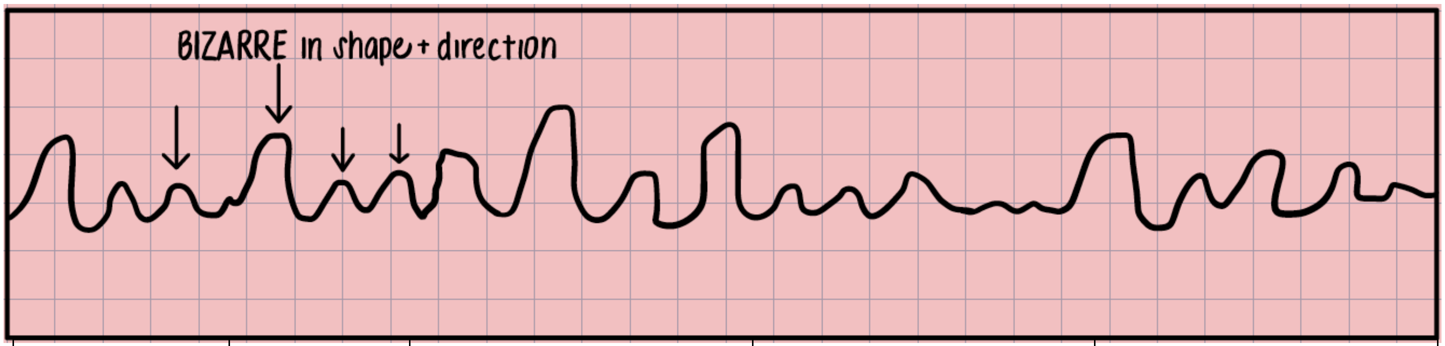
- Loss of consciousness or fainting
- Cardiac arrest

HOW DO WE TREAT? Follow steps

1. **Check pulse** → If pulse is present, identify and treat underlying cause, maintain patent airway, provide O2, cardiac monitor, monitor BP
2. **If symptomatic and persistent tachyarrhythmia causes:** hypotension, altered mental status, signs of shock, acute heart failure → Immediate synchronize cardioversion
3. **If persistent tachyarrhythmia is not causing one of the above:**
   - Look for wide QRS >0.12sec
     - If yes wide QRS → IV access, EKG, Adenosine, Antiarrhythmic
   - If no wide QRS → IV access, EKG, vagal maneuvers, Adenosine if complex is regular, BB, CCB

VENTRICULAR FIBRILLATION

Ventricular Rate: Too rapid to count



Heart Rate	Rhythm	P wave	PR Interval	QRS Complex
Rapid and disorganized	Grossly irregular	Unidentifiable	Not measurable (due to P wave being hard to measure)	Bizarre varying in shape and direction

WHY DOES THIS HAPPEN?

Lower heart chambers contract in a rapid and uncontrolled manner

- Most common: Myocardial ischemia or infarction
- Untreated ventricular tachycardia
- Hyperkalemia/hypokalemia
- Hypothermia, trauma
- Drug toxicity/overdose

SIGNS AND SYMPTOMS

Early:

- Rapid heartbeat (tachycardia)
- Chest pain
- Dizziness, nausea
- Shortness of breath
- Loss of consciousness

SEEK MEDICAL ATTENTION IMMEDIATELY

- If no pulse, immediately begin CPR until help arrives

HOW DO WE TREAT? Follow #1-9

1. Check pulse
2. Start CPR and give O2
3. Defibrillation → SHOCK!!
4. CPR (2 minutes) + IV access
5. If shockable rhythm → SHOCK!!
6. CPR (2 minutes) + Epinephrine q3-5min
7. If shockable rhythm → SHOCK!!
8. CPR (2 minutes) + Amiodarone
9. Complete #6-8 again if shockable rhythm

**If NO shockable rhythm = CPR (2 minutes) + Epinephrine q3-5min

PREMATURE VENTRICULAR CONTRACTIONS (PVC'S)

WARNING: >5 PVC'S/min can cause cardiomyopathy

Heart Rate	Rhythm	P wave	PR Interval	QRS Complex
Depend on underlying rhythm	Irregular	Unidentifiable	Not measurable (due to P wave being hard to measure)	Wide and bizarre; >0.12 seconds With Twave in opposite direction

WHY DOES THIS HAPPEN?

Extra heartbeats that begin in one of your heart's two lower pumping chambers (ventricles). May disrupt normal rhythm if consistent!

- Stress, activity, adrenaline, caffeine, illicit drugs
- Valvular disease
- Myocardial infarction, CAD, HTN
- Medications (decongestants, antihistamines)

SIGNS AND SYMPTOMS

- Fluttering
- Pounding or jumping
- Skipped beats or missed beats
- Increased awareness of your heartbeat

HOW DO WE TREAT?

- If symptomatic, advice against stimulants (caffeine, nicotine) that trigger PVC
- Medications: Beta blockers, Calcium channel blockers, antiarrhythmic (amiodarone)
- If unresponsive to medication or lifestyle change → Cardiac ablation

HEART BLOCKS

STORY + RHYME

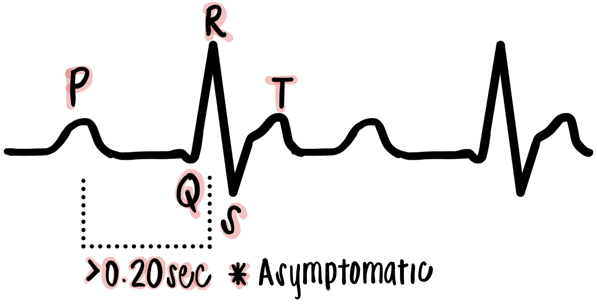
NORMAL SINUS RHYTHM

The P+ QRS are dating and never leave eachothers side

1ST DEGREE AV BLOCK

The P+QRS got into an arguement and are keeping their distance

Rhyme "If the R is far from the P, the you have a 1st degree"

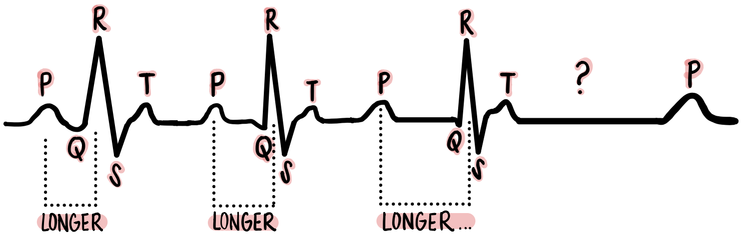


2ND DEGREE AV BLOCK

TYPE 1 AKA WENCKEBACH

The P+QRS are in a cycle of breaking up and getting back together. Repeat

Rhyme "Longer, longer, longer, DROP, Then you have a WENCKEBACH!"

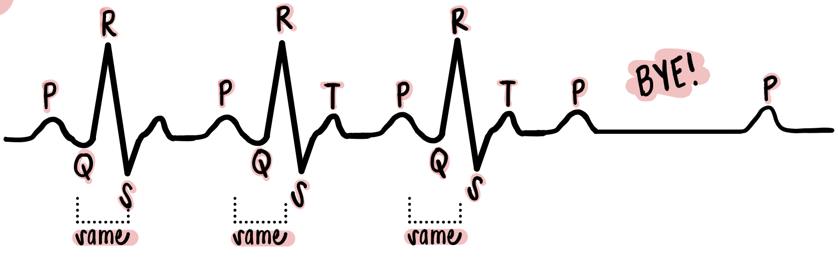


2ND DEGREE AV BLOCK

TYPE 2 AKA MOBITZ II

The P + QRS work it out but the P is upset at QRS and decides to go out

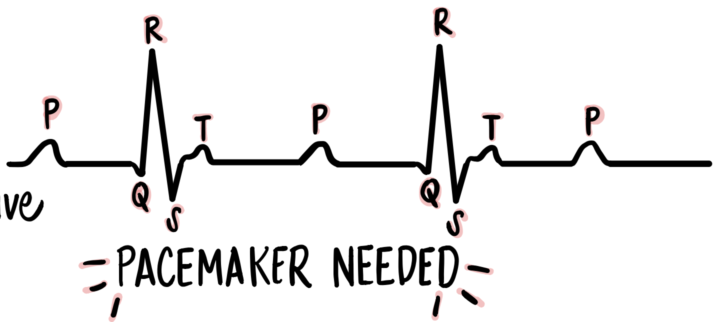
Rhyme "If some P's dont get through, then you have a mobitz II"



3RD DEGREE AV BLOCK

The QRS catches P cheating so they separate and live single lives

Rhyme "If P's and Q's dont agree, then you have a 3rd degree"



PHARMACOLOGY BUNDLE

CARDIOVASCULAR MEDS

BETA BLOCKERS (SUFFIX: -lol)

ACTION: Inhibits beta receptors from doing their job → lower HR/BP

KEY: $Beta_2$ receptors work on the lungs so we may see bronchospasm → **DO NOT give to asthma/COPD patients**

CONSIDERATIONS:
- can be given to ♥ failure pts
- may mask sx of hypoglycemia
- Always check HR/BP BEFORE giving → HOLD if BP<90/HR<60
- Watch orthostatic hypotension, wheezing, ↓HR, ↓BP

SELECTIVE (♥ only)
- Atenolol
- Metoprolol

NONSELECTIVE:
- Propanolol
- Sotalol

ACE INHIBITORS (-pril) → 1st choice
ARB's (-sartan) → 2nd choice

ACTION: BOTH inhibit the normal function of the RAAS system → lower BP by getting rid of Na^+/H_2O and ↑K^+

KEY: Teratogenic!
- With ACE → cough/angioedema (RISK: Airway)
- ↑ of K^+ in the body!

CONSIDERATIONS:
1. K^+ levels → EKG (Peak T wave/ST elevation)
2. K^+ diet → avoid K^+ rich foods
3. Watch BP/orthostatic hypotension

CALCIUM CHANNEL BLOCKERS

ACTION: Blocks movement of calcium which relaxes smooth muscle → ↓ resistance → ↓ BP

TYPES:
- -DIPINE (only lowers BP)
- -ZEM/-AMIL (lowers both HR/BP)

CONSIDERATIONS:
1. Do NOT give to ♥ failure pt (will worsen)
2. Always check HR/BP BEFORE giving → HOLD if BP<90/HR<60
3. Watch orthostatic hypotension/TOO LOW HR/BP
4. Headache = NORMAL finding

DIGOXIN (for HEART FAILURE)

→ can also be given as an antiarrythmic

ACTION: DOES not affect BP, ONLY HR
"DIG's for a forceful contraction"

THERAPEUTIC RANGE: 0.5-2.0

CONSIDERATIONS:
1. Does NOT waste potassium → Dont change K^+ diet (↓K^+ = ↑ RISK toxicity)
2. Monitor kidney function (BUN, cr) (↓ kidney function = ↑ risk toxicity)
3. S/S Toxicity: vision change, dizzy, N/V, irregular pulse, confusion

VASODILATORS (can be used in heart failure)

ACTION: Relaxes smooth muscle = ↓BP, ↑O_2 to major organs

NORMAL S/S: headache, flushing, hypotension

CONSIDERATIONS:
1. Do NOT take with viagra (sildenafil)
2. HOLD if BP systolic <100 or drops >30mmHg
3. Monitor BP + orthostatic hypotension

EX: Nitroglycerin, Nitroprusside, Hydralazine, Isosorbide

KEY TAKEAWAY:

1. Lowers BP: All except Digoxin
2. Lowers HR: Beta blockers, CCB's (zem and amil), Digoxin
3. Do NOT give with ♥ failure: CCB's
4. YES for ♥ failure: Digoxin, BB's, vasodilators, diuretics
5. NOT for pregnancy: ACE/ARB's
6. Watch vitals! Dont stop abruptly!

DIURETICS

① POTASSIUM WASTING (-IDE)

ACTION: **DRY** up the body by excreting (wasting) potassium → increase urination

KEY: **ONLY** give if K+ level is in range → **3.5-5.0 mEq/L**

USE: Heart failure, worsening crackles, new edema in the legs, rapid weight gain

A.) LOOP DIURETICS: Furosemide, Bumetanide, Torsemide

B.) THIAZIDE DIURETICS: Hydrochlorothiazide, Chlorothiazide

KEY: Watch for **decreased K+** = decreased heart beats (flat T wave, ST depression, U wave)

- **Encourage K+ rich foods** → Bananas, green leafy veggies, melon (NO licorice ROOT = ↓K+)
- **Furosemide:** given **too fast** = tinnitus, hypotension
  given **too long** = kidney damage, ↑BUN, ↑Cr, ↓K+

② POTASSIUM SPARING (SPIRNOLACTONE)

ACTION: Blocks Aldosterone directly = release Na+ and H_2O
"spares" potassium in the body

KEY: Watch for **increased** K+ = increased heart beats (Peak T wave, ST elevation)

- **Avoid K+ rich foods** / No salt substitutes
- Make sure to put on a **cardiac monitor**

③ MANNITOL (OSMOTIC DIURETIC)

ACTION: ↓ thickness of blood → ↑ cerebral blood flow → ↓ blood volume / IOP

USE: Treat increased intracranial pressure; lower eye pressure

SIDE EFFECTS: Headache, Nausea, acute renal failure (large doses)

MONITOR: Neurologic and renal status

KEY: FOR Potassium wasting + sparing:

- Always check BP; **HOLD** if systolic <100
- Always check BUN, Cr+, K+ levels; Heart monitor!
- Give in the **morning**, not at night!
- **DAILY WEIGHTS**
- **No sodium meds** (cough/flu, antacids, NSAIDs)
- **Teach** orthostatic hypo, **RISK** sunburns

RESPIRATORY MEDS

① BETA$_2$ AGONISTS (SUFFIX: -terol)

ACTION: Enhance the effects of Beta$_2$ in the body = **BRONCHODILATION**

TYPES:

SHORT ACTING
- For acute attack
- Not used for daily tx (>2x/WK = BAD)
- Can be used with steroid or anticholinergic

EX: ALBUTEROL

LONG ACTING
- NOT for acute attack
- should ONLY be taken in combo with a corticosteroid (never alone)

EX: SALMETEROL

SIDE EFFECTS: tachycardia, jittery, nervous, palpitations, tremor

KEY: If used in combo with steroid or anticholinergic → GIVE FIRST
- These are all typically **inhaled**

② CORTICOSTEROIDS (SUFFIX: -sone, -ide)

USED FOR: Asthma, rhinnitus, autoimmune disorders

ACTION: Reduce the inflammatory response by supressing the immune system
- can be used **alone** or with a **Beta$_2$ agonist**

SIDE EFFECTS: osteoporosis (affects calcium)
↑ glucose, ↓ K+, fluid retention + urinary retention
PUD, IMMUNOSUPRESSION!

MAY CAUSE:
- headache
- sore throat
- hoarseness
- **candidiasis**

↓

ORAL THRUSH
- use a spacer & rinse mouth!

Remember:
- ↑ stress = may need ↑ dose
- Never stop abruptly = TAPER
- monitor s/s of infection
- AVOID NSAIDS

EX: Beclomethasone, Fluticasone, Budesonide, Prednisone

RESPIRATORY MEDS

③ INHALED ANTICHOLINERGICS (SUFFIX: -ropium)

USED FOR: COPD, bronchitis, emphysema, asthma, allergies

ACTION: Block the parasympathetic nerve reflexes that cause the airway to constrict = BRONCHODILATION

- **Short acting:** IPRATROPIUM
- **Long acting:** TIOTROPIUM

can be used with albuterol = DUONEB

SIDE EFFECTS: Dry mouth, throat irritation, hoarseness, bitter taste → **KEY:** give sugarless candy or ↑ fluids

④ LEUKOTRIENE MODIFIERS (SUFFIX: -lukast)

USED FOR: Asthma, exercise induced bronchoconstriction

ACTION: Blocks the normal function of leukotreine to dilate the smooth muscle and ↓ mucus

KEY: Leukotreine typically causes smooth muscle to constrict and increase mucus production → **we are stopping this**

SIDE EFFECTS: headache, sore throat, cold symptoms

KEY: NOT for acute attack!

MONTELEUKAST: Take in the evening or 2hr before exercise

ZAFIRLUKAST: Take on empty stomach, check liver enzymes

⑤ XANTHINES (THEOPHYLLINE)

USED FOR: Long term asthma / COPD

ACTION: ↑ cAMP = BRONCHODILATION

SIDE EFFECTS:

MINOR	MAJOR
GI upset	seizure
Headache	dysrhythmias
nervous	

KEY: Avoid caffeine!

Not as common toxicity level: 10-20mcg/mL

RESPIRATORY MEDS

EXPECTORANTS

USED FOR: Nonproductive cough

ACTION: Decrease viscosity of lung secretions; this will make the cough more productive

SIDE EFFECTS: Headache, dizzy, N/V

› **Prolonged use:** may mask an underlying serious condition for which you have the cough

EX: GUAIFENESIN

MUCOLYTICS

USED FOR: Pulmonary disorders with thick mucus (CF, COPD, PNA)

ACTION: Breaks down tenacity and viscosity of secretions

SIDE EFFECTS: Bronchospasm (watch w/ asthma)
› N/V, Rash
› Headache, dizzy

WATCH: Pts with PUD, asthma, esophageal varices

EX: ACETYLCYSTEINE
DORNASE ALFA

DECONGESTANTS (ORAL + TOPICAL)

USED FOR: Rhinitus, sinusitus, common cold

ACTION: Vasoconstricts the respiratory mucosa = ↓ inflammation

Relief of pain and congestion

SIDE EFFECTS: Palpitations, restless
› weakness, HTN, nervous

{REBOUND CONGESTION}

WATCH: If taking with other OTC products

EX: PSEUDOEPHEDRINE
PHENYLEPHRINE

ANTIHISTAMINES

USED FOR: Seasonal allergies, urticaria, angioedema, allergic conjunctivitis

ACTION: Blocks histamine at Histamine-1 receptor sites
› Anticholinergic + antipyretic effect

SIDE EFFECTS: itching, sneezing, hives, GI upset, nausea, dry mouth, constipation, sedation, drowsy

{FALL RISK

CONTRAINDICATED: PREGGO}

EX: 1st GEN: DIPHENHYDRAMINE
2ND GEN: LORATADINE / CETIRIZINE

NONSTEROIDAL ANTIALLERGY

CROMOLYN

USED FOR: 3rd line drug for mastocytosis

ACTION: Stops mast cells from secreting Histamine

SIDE EFFECTS: Burning in nose
Itchy, watery eyes
Bad taste in mouth

{KEY: NOT QUICK = LONG TERM!

SUBCUTANEOUS ANTI-INFLAMMATORY

OMALIZUMAB

USED FOR: Allergic asthma, chronic idiopathic urticaria

ACTION: Blocks the role of IgE = ↓ allergic response

SIDE EFFECTS: Itching, mild rash
› Nausea, dizzy, ear pain
› cold symptoms
› pain in arms or legs

{KEY: NOT QUICK
NO LIVE VACCINES d/t immunosupp.

HYPERLIPIDEMIC MEDS

KEY: For all medications in this class:

1. All will affect the **liver** and **lipid profile**
2. Medications will most likely **NOT** be prescribed to lower cholesterol during **pregnancy**.
3. **LFT's:**
   - AST: 10-40 U/L
   - ALT: 7-56 U/L
   - ALP: 40-120 U/L
   - Billi: <1 mg/dL

   LIPID PANEL:
   - Total cholesterol: <200
   - Triglycerides: <150
   - LDL: <100
   - HDL: >60

① STATINS (SUFFIX: -statin)

USED FOR: Decrease cholesterol + Reduce risk of MI or stroke

ACTION: Blocks the enzyme HMG-CoA reductase to slow down cholesterol production

SIDE EFFECTS: Liver toxicity
- myopathy (muscle pain)
- rhabdomyolysis

WATCH: LFT's and CK levels **(Nml: 22-198 U/L)** → metabolized in liver excreted by kidneys
- **Avoid Alcohol**
- **TAKE IN THE EVENING**

② BILE ACID SEQUESTRANTS (PREFIX: cole-)

AKA: RESINS

USED FOR: lowering cholesterol (LDL)

ACTION: ↓LDL by binding bile acids in the gut = pee out = pulls more cholesterol from bloodstream to make bile

SIDE EFFECTS: constipation, flatulence, GI disturbance, bad taste

KEY:
- Teach ↑fiber / ↑fluids = interferes with absorption of fat soluable vitamins A, D, E, K (a fat DEK of cards)
- TAKE WITH FOOD

EX: COLESEVELAM
COLESTEPAL

HYPERLIPIDEMIC MEDS

③ CHOLESTEROL ABSORPTION INHIBITORS (EZETIMIBE: "zip" through the intestines)

USED FOR: lowering cholesterol (LDL)

ACTION: ↓ LDL by inhibiting absorption of cholesterol in the intestines

SIDE EFFECTS: Liver toxicity

- Myopathy (muscle pain) → rhabdomyolosis
- May cause headache, dizziness, fatigue

WATCH: LFT's + CK levels **(Nml: 22-198 U/L)**

- **Watch** in pregnancy <u>IF</u> given

④ NAICIN/NICOTINIC ACID (VIT. B3)

USED FOR: lowing cholesterol (LDL) <u>and</u> Triglycerides

↑ HDL ü

ACTION: when given well above the vitamin requirement it will reduce the release of fatty acids

SIDE EFFECTS: Liver toxicity

- Myopathy, gout (hyperuricemia)
- N/V/D, hyperglycemia
- **Flushing → USE ASPIRIN**

WATCH: LFT's + CK levels **(Nml: 22-198 U/L)**

- **Blood glucose**

⑤ FIBRATES (ALL include "fib" in the name) → Gemfibrozil, Clofibrate, Fenofibrate

USED FOR: lowering triglyceride levels

↑ HDL ü

ACTION: Liproprotein lipolysis

SIDE EFFECTS: Liver toxicity

Myopathy

Gallstones, GI upset, N/V

WATCH: LFT's + CK levels **(Nml: 22-198 U/L)**

KEY: Give **30min before** breakfast + dinner!

ALL ABOUT INSULIN

RAPID-ACTING

1. Aspart
THINK: "Move your Ass" → Ass-part

2. Lispro
THINK: "Let's go!!" → Lispro

3. Glulisine
THINK: Glue dries fast

Onset: 15 MIN!
Peak: 30-90 minutes
Duration: 3-5 hours

SHORT-ACTING

AKA: Regular Insulin

KEY: This is the ONLY insulin type given IV route

- Can be given with NPH at the *same* time in the *same* syringe
- Can be given with long-acting at the *same* time in a *different* syringe

Onset: 30-60 minutes
Peak: 2-4 hours
Duration: 5-8 hours

INTERMEDIATE-ACTING

AKA: NPH

KEY: If given with regular insulin, draw up: **clear-to-cloudy**

THINK: R-N → Regular *before* NPH (clear before cloudy)

- Given 2x/day

Onset: 60-120 minutes
Peak: 4-12 hours
Duration: 14 hours (hence, given 2x/day)

LONG-ACTING

KEY: NO PEAK

- CAN'T BE MIXED WITH OTHER INSULIN!

1. Detrimir
THINK: "Lasts all year" → lasts a long time

2. Lantus
THINK: "Lantern" → lanterns burn for a long time

3. Glargine
THINK: "Large" → lasts for a large amount of time

Onset: 60-120 minutes
Peak: NO PEAK
Duration: 24 hours

WHEN DO YOU EAT?

1. Rapid-acting: Covers insulin needs for meals eaten at the *same* time of injection

2. Short-acting (Regular): Covers insulin needs for meals eaten within *30-60 minutes* of injection

3. Intermediate-acting (NPH): Covers insulin needs for *half* the day or overnight; typically given morning and night

4. Long-acting: Covers insulin needs for the *full* day; can be combined with other insulin but never mixed

RULES OF INSULIN

- Watch for signs and symptoms of hypoglycemia → shaky, clammy, pale, sweaty
  - THINK: "Cool and clammy, give me candy"
  - IF *AWAKE:* Ask the patient to eat (candy, juice, low fat milk)
  - IF *UNCONSCIOUS:* Stab with IV D50
- Regular insulin: ONLY insulin given IV
- NPH: If mixed, clear-to-cloudy (NPH is cloudy)
- Long-acting: Do not mix; NO PEAK
- Rotate injection sites → do not aspirate/massage
- **Always** increase insulin with: (glucose↑with any type of stress)
  - Stress
  - Sepsis
  - Sickness
  - Steroids

REMEMBER

TYPE 1: YOU HAVE NONE

- NO insulin being produced
- Patients will need insulin!

TYPE 2: THE PROBLEM IS YOU

- Encourage healthy diet and exercise
- Potential oral medication use
- Insulin (last resort)

INSULIN PUMP

- Give a steady dose of insulin for Type 1 DM
- Check BG 4x/day
- Push bolus at meals

ANTICONVULSANTS

① PHENYTOIN

ACTION: slows down impulses in the brain that cause seizures

USE: Treat and prevent seizures

SIDE EFFECTS: GINGIVAL HYPERPLASIA!
› Diplopia, Rash, ↓ BP

SIGNS of TOXICITY: Nystagmus, slurred speech, Ataxia, vomiting

THERAPEUTIC RANGE: 10-20mcg/mL

KEY: ↓ effectiveness of oral contraceptives
Avoid Milk + antacids (↓ absorption)
Take with food ; Regular dental checkups

② LAMOTRIGINE

ACTION: Inhibits Na+ transport → ↓ seizures

USE: Best for partial seizures, mood stabilizer

SIDE EFFECTS: ↑ Risk of suicidal thoughts
Double vision, Headache
Drowsy, Dizzy, N/V

KEY: Watch for worsening depression or mood changes
› DO NOT STOP ABRUPTLY
› ↓ evectiveness for oral contraceptives

③ BARBITUATES (PHENOBARBITAL)

ACTION: stimulates GABA → elevates seizure threshold → ↓ excitement in brain

USE: Tonic clonic, focal, status epilepticus

SIDE EFFECTS: Drowsy, Ataxia, Respiratory depression, ↓ BP

THERAPEUTIC RANGE: 15-40 mcg/mL

KEY: Monitor breathing and routine neurochecks

④ VALPROATES (VALPROIC ACID)

ACTION: not fully understood, may ↑ levels of GABA

USE: simple + complex seizures

SIDE EFFECTS: N/V/D, dizzy, drowsy
Tremor, Tinnitus
↑ Bleeding time
↓ Platelet count

KEY: monitor WBC's, platelets, liver enzymes, LFT's

⑤ CARBAMEZEPINE

ACTION: Inhibits Na+ transport → ↓ seizures

USE: Tonic clonic, partial, mood stabilizer

SIDE EFFECTS: AGRANULOCYTOSIS! → infection risk
Hyponatremia, Dizzy, drowsy, N/V

KEY: Watch for worsening depression or mood change
› DO NOT STOP ABRUPTLY

ANTIPSYCHOTICS

KEY: For all psychiatric conditions:

DOPAMINE (Think "DOP")
- D: Determination for a reward
- O: Obsession (addicting)
- P: Pleasure

NOREPINEPHRINE (Think "NOR")
- N: No hesitation ↑HR ↑BP
- O: On Alert
- R: Recall is good!

SEROTONIN (Think "SER")
- S: sleep
- E: emotion
- R: Remember (good memory)

(+) SCHIZOPHRENIA SX: experiencing things you **SHOULDNT** be (Hallucinations, Delusions, Disorganized Thinking)

(−) SCHIZOPHRENIA SX: lack of characteristics that **should** be there (Flat/blunt affect, isolation, lack of interest, ↓ speech)

① FIRST GENERATION (AKA TYPICAL/CONVENTIONAL)

SUFFIX: −ZINE + HALOPERIDOL (Haldol)

ACTION: Block D_2 receptors on ALL Pathways of the brain

USE: (+) schizophrenia symptoms

SIDE EFFECTS:

1.) **Extrapyramidal symptoms:** Parkinsons-like sx, dystonia, shuffling gait, tardive dyskinesia
   KEY: GIVE BENZTROPINE

2.) **Neuroleptic Malignant syndrome:** High Fever, variable BP, ↑HR, muscle rigidity, confusion
   KEY: GIVE MUSCLE RELAXANT

3.) Anticholinergic sx, orthostatic hypotension, seizures

② SECOND GENERATION (AKA ATYPICAL) more current

SUFFIX: −APINE, −DONE

ACTION: Block D_2 **AND** serotonin receptors (level out amount of dopamine)

USE: (+) **AND** (−) symptoms of schizophrenia

SIDE EFFECTS:

1. **Metabolic symptoms:** hyperglycemia (Diabetes), ↑ weight, ↑ cholesterol
2. Anticholinergic sx, decreased libido, sedation, orthostatic hypotension

KEY: Clozapine → **AGRANULOCYTOSIS** (watch: immunosuppression)
Risperidone → can be injected q2wks via IM route

MOOD STABILIZERS

USE: For the treatment of BIPOLAR DISORDER

① LITHIUM

ACTION: Helps reduce severity and frequency of manic episodes
- unknown how it does this (may inhibit MOA → ↑ activity of the brain)

SIDE EFFECTS: **LEUKOCYTOSIS!**
increased urination / thirsty
tremors, hypothyroidism
nausea, fatigue

- **similar to SALT → DO <u>NOT</u>** cut out salt from your diet **(↑ RISK TOXICITY)**

THERAPEUTIC RANGE: 0.6–1.2 mEq/L
- **weekly** blood draws until levels are steady → then 3mo intervals
- **Monitor for salt loss** → Fever, sweating, diarrhea

- **Teratogenic**
- **1-3 WKS** for full effect

② ANTICONVULSANTS

- Valproic Acid → Acute mania attack preferred over lithium due to **less side effects**
- carbamezepine → **AGRANULOCYTOSIS**
- lamotrigine

③ ANTIPSYCHOTICS

- Olanzapine
- Risperidone
- Aripiprazole

④ BENZODIAZEPINES (-PAM, -LAM)

ANTIANXIETY MEDS

① BENZODIAZEPINES (-PAM, -LAM)

ACTION: Bind to GABA receptors to enhance the action of GABA

GABA: Neurotransmitter that slows (calms) the speed of brain activity

SIDE EFFECTS: sedation, ↓RR, ↓BP, ↓HR, amnesia

KEY: **FAST ACTING** (Think: Pam is riding in a Benz, which is fast) → Antidote: Flumazenil

↓ **short term use only!** can cause **DEPENDENCY**

② SSRI's (SELECTIVE SEROTONIN REUPTAKE INHIBITORS)

ACTION: see Antidepressants

USE: Anxiety, depression, PTSD, OCD (Think: Teens (-tine) have a lot of anxiety)

SIDE EFFECTS: weight gain, insomnia, sexual dysfunction

4WKS for full effect!

KEY: Do not take with St. Johns Wort

SUFFIX: -TINE, -LINE, -PRAM

③ ATYPICALS - BUSPIRONE

USE: Anxiety, PTSD, OCD, Panic

1-2WKS for full effect!

SIDE EFFECTS: Dizzy, headache, nausea

KEY: Does **NOT** cause sedation **OR** dependency!

Take with **food** if GI upset

④ OTHERS:

TRICYCLIC ANTIDEPRESSANTS

BETA BLOCKERS

BARBITUATES (-barbital) = stays in system for **3-5 days**

ANTIDEPRESSANTS

KEY: Take 2-4 WKS to take full effect
THINK: 4 letters in "SSRI" → 4 WKS
› RISK FOR SUICIDE

① SSRI's (SELECTIVE SEROTONIN REUPTAKE INHIBITORS)

ACTION: inhibit the reuptake of serotonin back into the neuron → more serotonin floating around in the brain → improve mood

SIDE EFFECTS: weight gain, insomnia, sexual dysfunction

RISK: serotonin syndrome → Agitation, hallucinations, fever, tremors, sweaty

SUFFIX: -TINE, -LINE, -PRAM

② SNRI's (SEROTONIN-NOREPINEPHRINE REUPTAKE INHIBITORS)

ACTION: inhibit the reuptake of serotonin AND norepinephrine into the neuron → more floating in the brain

SIDE EFFECTS: loss of appetite, insomnia, sexual dysfunction

③ TCA's (TRICYCLIC ANTIDEPRESSANTS) -TRYPTLINE -IPRAMINE

ACTION: TRI = 3 actions →
1. inhibit serotonin reuptake
2. inhibit norepinephrin reuptake
3. inhibit Alpha receptors → orthostatic hypotension
   Histamine → sedation
   Muscarinic receptors → anticholinergic sx

USE: depression, anxiety, insomnia, fibromyalgia

SIDE EFFECTS: All of these ↗ + urinary retention

KEY: Be careful in the sun ("cycle") → ↑fiber / ↑fluids

④ MAOI's (MONOAMINE OXIDASE INHIBITORS)

Ex: Phenelzine, Isocarboxazid

ACTION: Blocks the destruction of serotonin, norepinephrine, dopamine and TYRAMINE → increase ALL of these in the brain

USE: Depression, panic disorder

SIDE EFFECTS: Agitation, anxiety, ↓BP, HYPERTENSIVE CRISIS (interacts with many meds) DO NOT EAT TYRAMINE FOODS!! (chocolate, avo, wine, cheese)

⑤ ATYPICALS

A. Buproprion (wellbutrin) → for depression + smoking cessation
B. Trazadone → for depression (high dose) + insomnia

ANTIPARKINSON MEDS

REMEMBER: Patients have either **TOO LITTLE** Dopamine or **TOO MUCH** Acyticholine

Characteristics:
- Pin Rolling Tremors
- Blank expression
- Stooped Posture
- Shuffling gait
- Muscle Rigidity
- Possible mental deterioration

① ANTICHOLINERGIC AGENTS (BENZTROPINE)

ACTION: Atagonizes Acetylcholine and histamine receptors → ↓ Ach

USE: Decrease muscle rigidity and tremors

SIDE EFFECTS: Anticholinergic symptoms: Dry mouth, dry eyes, blurry vision urinary retention, constipation

TEACH: chew gum (dry mouth)
wear sunglasses, ↑ fiber, ↑ fluid

KEY: Do **not** give to a patient with glaucoma; **No alcohol; Dont stop abruptly**

② MAO-B INHIBITORS (RASAGILINE aka AZILECT)

ACTION: increase dopamine by inhibiting MAO activity

USE: improve shaking + stiffness, Decrease amount of Offtime (periods of slow movement)

SIDE EFFECTS: Dizzy, drowsy, nausea, heartburn, dry mouth

KEY: **Avoid foods with Tyramine!** → cheese, chocolate, wine, avo, beer

③ COMT INHIBITORS (-CAPONE)

ACTION: Decrease wearing off of carbidopa/levodopa by blocking COMT enzyme

USE: With carbidopa/levodopa (slows breakdown of levodopa)

④ DOPAMINE AGONISTS:

CARBIDOPA/LEVODOPA → decrease muscle rigidity and tremors

ACTION: increase Dopamine → carbidopa prevents levodopa from being converted into Dopamine in the bloodstream → ↑ Dopamine entering the brain

SIDE EFFECTS: N/V, drowsy, dyskinesia, Dark urine/sweat, ↓ BP

KEY: May take ~**3WKS** to be effective, **↑ protein = ↓ effectiveness**

NO MAOI'S

ROPINIROLE (AKA REQUIP) → improve tremors, muscle spasm, stiffness

May also be used for Restless leg syndrome

SIDE EFFECTS: Drowsy, confusion, Orthostatic Hypotension → **FALL RISK**

SPASMOLYTICS

MUSCLE RELAXANTS

① DANTROLENE → Direct acting on the muscle cell

USED FOR: ↓ muscle spasticity in spinal injuries, cerebral palsy, multiple sclerosis, malignant hypothermia

ACTION: Prevents **calcium** release in skeletal muscle = ↓ **muscle spasticity**

SIDE EFFECTS: Drowsy, muscle weakness, GI upset

› **Hepatic toxicity**

WATCH: Liver enzymes

② BACLOFEN → "used if you pull your BACK"

Centrally Acting on the CNS

USED FOR: same as Dantrolene!

ACTION: Enhances **GABA** in the CNS = ↓ **muscle spasticity**

What is GABA? A neurotransmitter in the brain that slows the speed of messages between cells

SIDE EFFECTS: Drowsy, nausea, GI upset, constipation

TEACH: ↑ Fiber and ↑ fluids to combat constipation

③ TIZANIDINE

Centrally Acting on Alpha$_2$ adrergic agonist

USED FOR: same as Dantrolene and Baclofen!

ACTION: Inhibits **presynaptic motor neurons** to decrease # of spasms, alleviate clonus and improve mobility

SIDE EFFECTS: LESS muscle weakness than Baclofen

› Dry mouth, drowsy, dizzy

ADHD MEDS

① METHYLPHENIDATE (RITALIN)

- Short Acting

② AMPHETAMINE (ADDERALL)

- Short Acting: onset 30-45min
  wear off 3-6HRS
- long Acting: ("XR" = extended release)
  onset 45-1HR
  wear off 8-12HRS
- KEY: Do not take at night - insomnia
  Take immediately before/after a meal
  Monitor weight

SIDE EFFECTS:
- weight loss
- decreased appetite
- insomnia
- dysrhythmias
- moody/irritable

WITHDRAWAL MEDS

① ALCOHOL → as early as 6 hours

PEAK: 24-48 HRS

KNOW TIME OF LAST DRINK!

A. Benzodiazepines: ↓ withdrawal, ↓ Risk seizures, stabilize vitals
B. Anticonvulsants: ↓ Risk seizures
C. Antihypertensives (clonodine) + Beta Blocker: ↓HR, ↓BP, ↓craving

② OPIOID

A. Methadone (long term maintence)

③ NICOTINE

A. Buproprion
B. Nicotine Replacement
C. Varenicline

④ ABSTINENCE - supress patient craving

A. Disulfiram
B. Naltrexone
C. Acamprosate → ↓ anxiety/Restlessness
"A camp makes you happy"

BAD with alcohol:
- N/V, sweating
- Palpitations

ALCOHOL ADDICTION TREATMENT

MEDICATIONS

NALTREXONE → REDUCES OR ELIMINATES ALCOHOL CRAVING

ACAMPROSATE → HELPS PATIENT ABSTAIN FROM ALCOHOL

TOPIRAMATE → DECREASE ALCOHOL CRAVINGS

DISULFIRAM → REACTION WITH ALCOHOL CAUSES UNPLEASANT PHYSICAL EFFECTS

NALTREXONE → HELP REDUCE ALCOHOL CRAVING

ALCOHOL WITHDRAWAL MEDICATIONS

RISK OF SEIZURES

seizures MAY occur 24-48 hours after last drink

→ we want to stay prepared for this risk by giving:

- BENZODIAZEPINES
- ANTICONVULSANTS
- BETA BLOCKERS
- MAGNESIUM SULFATE
- THIAMINE (B1), FOLIC ACID

WITHDRAWAL SYMPTOMS: (as early as 6 hours) tremors, vomiting, anxiety, irritability, high blood pressure, ↑HR, confusion

SEIZURE SYMPTOMS: extreme confusion + agitation, ↑HR, fever, sweating, LOC, aura, headache

NSAID's + ACETAMINOPHEN

TYPES:

1. Naproxen
2. Salicylate Acid (Aspirin)
3. Acetylsalicylate Acid (also Aspirin)
4. Ibuprofen
5. Keterolac (Toradol)

AVOID WITH:

- Vitamin E
- Garlic
- Gingko
- Omega 3 oils

CHARACTERISTICS:

KEY: Does not cause CNS symptoms

- **ANTIPYRETIC** → decrease fever
- **ANTI-INFLAMMATORY** → decrease prostaglandin synthesis
- **ANALGESIC** → decrease pain
- **ANTI-PLATELET** (Aspirin) → **RISK = Bleeding**

NURSING CONSIDERATIONS:

- NSAIDs affect the **kidneys!**, **liver, heart** and **GI system**
- **DO NOT use in patients with**
  - Asthma → bronchospasm
  - Ulcers → worsen + GI bleed
  - Kidney disease = ↑ Cr, ↑ BUN, Renal injury in long term
  - Ibuprofen = ↑ **RISK** HTN + stroke
  - Heart failure / Cardio disease (most contain Na+ = ↑ edema)
- can **increase risk** of blood clots except Aspirin
- **OK** to take if on **PPI** (proton pump inhibitor)
- **Take with food! Lowest Dose! No Alcohol!**

ASPIRIN KEY THINGS:

1. Has all the same properties **AND thins blood**
2. **Monitor** for s/s of bleeding, hypotension, tachycardia
3. **Monitor** for **toxicity** = earliest sign = **TINNITUS**
4. **DO NOT GIVE to Kids** → Reye's syndrome!

NOT AN NSAID: TYLENOL
(Acetaminophen)

1. Used instead of NSAIDs to ↓ **RISK** of bleeding in PUD + hemophilia
2. Analgesic, Antipyretic
   NOT anti-inflammatory
3. **can** be taken with ibuprofen
4. **TOO MUCH = liver damage** = monitor LFT's

{ Antidote: ACETYLCYSTEINE

ANTIBIOTICS

BROAD SPECTRUM (-CILLIN -CEF/-CEPH)

- safe for pregnancy + breastfeeding
- ALLERGY to -cillins, ASSESS type of reaction FIRST before giving a -ceph drug

-CILLINS
1. watch with oral contraceptives
2. Take with food! shake well!
3. SIDE EFFECT: bleeding (watch clot time)

-CEF/-CEPH
1. can cause C Diff; Does not treat CDiff
2. Take with food if GI upset
3. SIDE EFFECT: diarrhea (common)

HIGHLY TOXIC ABX (-mycins/-micin)

"A SIN TO GIVE"

USE: MRSA + CDIFF

- Toxic to the Kidneys, Ears + Liver
  1. Monitor Peak/Trough level 15-30min BEFORE given
  2. Monitor S/S Toxicity:
     Kidneys: ↑BUN, ↑Cr, ↓UOP
     Ears: vertigo, tinnitus
  3. very strong! Monitor IV site q30min!!

Ⓐ Glycopeptide = vancomycin

- Red Man syndrome → NOT deadly = sudden onset rash, flushing, hypotension
  → slow infusion over 1hr

Ⓑ Aminoglycosides = Gentamicin, Tobramycin

- very Toxic w/ vanco
- NO Red Man syndrome

-THROMYCINS (AZITHROMYCIN ERYTHROMYCIN)

BIG LIVER TOXIC → watch AST/ALT and when a patient is taking Tylenol

- "Throw" the QT interval → ↑QT interval = cardiac arrest
- Take on empty stomach with full glass of water → NO FOOD

-CYCLINES (TETRACYCLINE DOXYCYCLINE)

- Teratogenic! → also watch oral contraceptives
- Tooth discoleration
- AVOID the SUN → "cycling in the sun"

WHEN TAKING:
- NO food → Empty stomach with water
- NO Ca+ + iron → blocks absorption
- sit up 30min after taking (RISK: Esophagitis)

UTI MEDS (SULFA- -FLOXACIN)

Ⓐ SULFA - stops folic acid synthesis
- Teratogenic
- Avoid the sun → "sit on sofa inside"
- watch for ↑ crystals, ↑specific gravity
- Encourage water + Folic acid

Ⓑ FLOXACIN
- Avoid the sun
- Take with water → NO FOOD
- Report muscle pain (↑RISK Achilles tendon tear)

PHENAZOPYRADINE (Pyridium)
NOT an ABX → supportive care
Normal: Red orange body fluid!
Watch: Jaundice (BIG liver toxic)

METRONIDAZOLE (-Dazole) AKA FLAGYL

USE: CDIFF, STI's (Trichomoniasis)
AVOID: Alcohol during + 3days after treatment
NML: Brown urine, metallic taste
BAD: new rash/skin peeling = Stevens Johnson syndrome

ANTIFUNGAL (FLUCONAZOLE)

USE: candidiasis
watch in pregnancy: Teratogenic, only given when benefit outweigh risk

SIDE EFFECT: GI liver toxicity = watch LFT's, CBC, Renal
CONTRAINDICATED: Phenytoin, Digoxin, anticoags

KEY TAKEAWAY:

1. ineffective oral contraceptive: -cillins -cyclins
2. NO FOOD, WITH WATER
   - Thromycin
   - Tetracycline
   - Floxacin
   "Move The Food"
3. NO SUN: -cycline (cycling)
   sulfa (sofa)
   -floxacin
4. Extremely TOXIC: MYCIN
5. Teratogenic: -cycline
   sulfa
   antifungal

FINISH THE PRESCRIPTION

ANTIVIRAL MEDS

WHAT ARE THEY? Agents used to treat the diseases caused by viruses like **chickenpox** and the **common cold**

① ACYCLOVIR

USED FOR: Herpes simplex virus →
- cold sores
- encephalitis
- shingles
- genital infections
- varicella zoster

{ **Drug of choice for KIDS**
- Given IV, Oral, Topical

WATCH: **signs of Renal impairment**
- pregnancy
- ↑ **doses** = Nephrotoxicity and Neurotoxicity (headace, confusion, hallucinations)

② GANCICLOVIR

USED FOR: Cytomegalovirus → infections affecting the eyes, respiratory tract and liver

- Given IV Route

WATCH: Bone marrow suppression (big side effect)
- Monitor signs of infection and CBC

FOR BOTH:

1. Prevent viral DNA replication
2. Do **NOT** cure → only reduce symptoms
3. **Avoid sex** when lesions are present (use condoms)
4. **Topical** → wear gloves when administering
5. IV → watch for phlebitis (common)
6. May cause **GI upset** and **nephrotoxicity!**

MODE OF ACTION:
-vir drugs **inhibit** viral DNA polymerase and prevent replication of viral DNA

OPIOID ANALGESICS

ACTION: Bind to opioid receptors in the central nervous system to sedate the body

CHARACTERISTICS:

- Analgesic
- sedative
- Low and slow vitals (↓RR, ↓HR, ↓BP)

DOES NOT decrease fever or inflammation

TYPES:

1. Morphine
2. Hydromorphone
3. codeine
4. Oxycodone
5. Oxycontin
6. Fentanyl

NURSING CARE:

- Teach breathing exercises
- Always **monitor** vitals/orthostatic hypotension
- Dizzy? sit the patient down **FIRST, then assess**
- Antidote: Naloxone

IV ADMINISTRATION:

1. 2-3 min IV push (Dont bolus = DEATH)
2. Reassess 15-30 minutes
   (PO opioids = reassess in 1hr)
3. Watch for Risk of overdose! Also: respiratory depression, elderly, underlying disease (COPD/Asthma), post op
4. NORMAL: IV Burn ✓
   Itching/N/V → goes away ✓
   slow GI → give stool softener, fluids, ambulate ✓

PCA PUMP POST OP:

- client controlled **ONLY**
- Notify HCP to ↑ dose if:
  - Twice the dose of med given and still reports pain

SIGNS OF OVERDOSE:

- ↓RR <12, unarousable, dizzy, confused
- easily falls asleep when talking
- cold, clammy skin, deep gurgling

ANTIDOTE: NALOXONE (narcan)

KEY: 1-2hr ½ life → reassess and give another dose if needed

ASSESS: ABC's, O_2, Tell HCP, 2nd Dose

FENTANYL (for chronic pain)

- <u>can</u> give if allergy to codeine
- SE: constipation
- common: Patch (<u>not</u> give immediate relief)
  → 17hr full effect
  → Remove old patch before new!!

TUBERCULOSIS MEDS

KEY THINGS:

1. Treatment lasts approximately 6-9 MONTHS
2. sputum samples are needed q2-4 WEEKS
3. NO LONGER INFECTIOUS WHEN: 3 Negative sputum cultures on 3 different days
4. Always wear N-95 mask
5. Family should be tested (The baby is safe in pregnancy ü)

① RIFAMPIN

- causes Red/Orange tears, sweat, urine = NORMAL
  - → Teach to wear glasses, NOT contacts
- Makes oral contraceptives ineffective
- Monitor Jaundice → Liver TOXIC

② INH = ISONIAZID

- interferes with absorption of vitamin B6 (causes peripheral neuropathy)
  - → Take B6 25-50mg/day
- causes neuropathy → report numbness, tingling, ataxia
- LIVER TOXIC → monitor jaundice, dark urine, fatigue, elevated LFT's

③ ETHAMBUTOL

- "E" for EYES → report blurred vision, vision change, color change
- Get routine eye exams
- Generally safe for liver

④ OTHER: PYRAZINAMIDE (Hepatotoxic!)

CHEMOTHERAPY MEDS

① LEUPROLIDE (Prostate cancer)

ACTION: Decrease levels of Testosterone

SIDE EFFECTS: hot flashes, bone loss, ↓ libido, gynecomastia (↑ breast tissue)

KEY: Encourage **Ca+** and **Vit. D**, assess for bone pain / urine output / bladder distention

- **Monitor** Prostate specific antigen + testosterone level

② TAMOXIFEN (Breast cancer)

ACTION: competes with estrogen for binding sites in the breast + stops the growth of estrogen dependent cancer

SIDE EFFECTS: hot flashes, GI upset, ↑ Ca+, ↑ Risk PE, ↑ Risk endometrial cancer

KEY: **Monitor** calcium levels, CBC, Platelets

{ **Think:** a lady named **Tami** for **Tamoxifen** }

③ INTERFERON ALPHA-2B (Biologic Response Modifier)

USE: cancer + hepatitis → "**Interferes**" with cancer

ACTION: ↑ immune response to tumors + viruses; ↓ cancer cell production

SIDE EFFECTS: Flulike sx, bone marrow suppression, ♥ toxicity, neurotoxicity, GI upset, Alopecia

④ DOXORUBICIN (Antitumor antibiotic)

ACTION: binds to DNA → inhibits DNA/RNA synthesis → death to rapidly dividing cells

SIDE EFFECTS: GI upset, Alopecia, ♥ toxicity

- Bone marrow supression = anemia, neutropenia, thrombocytopenia
- **Red** discoloration of urine, sweat, tears

KEY: **Monitor** for s/s of **infection**

- Give antiemetics
- **Monitor** ♥ function and CBC

{ **Think:** "**Ruby Red**" for red discoloration, the heart and blood for bone marrow ☺

CHEMOTHERAPY MEDS

⑤ FOR A VARIETY OF CANCERS:

VINCRISTINE (Anti-mitotic)

ACTION: Stops cell division in mitosis

SIDE EFFECTS: Peripheral neuropathy, Alopecia
- Phebitis, GI upset

KEY: **Monitor** s/s of neuropathy (tingling)
- Give antiemetics
- Administered best by PICC line or central line
- Does <u>NOT</u> cause bone marrow supression

Think: **"VIN"** is wine in French → Too much wine you cant feel your arms and legs

CYCLOPHOSPHAMIDE (Alkylating Agent)

ACTION: Inhibits protein synthesis

SIDE EFFECTS: GI upset, alopecia
- BONE MARROW SUPPRESSION = anemia, leukopenia, thrombocytopenia
- Hemorrhagic cystitis!!

KEY: increase fluid intake
- **monitor** for blood in urine
- **Monitor** CBC, give anti emetics

TRAUMA MEDS

LIDOCAINE:

ACTION: temporarily **numbing** and relieving pain
> IV = to treat **VFib/VTach**
· **supresses** ventricular cells
· ↓ diastolic depolarization

USE FOR: **Local Anesthetic** (and topical)
Ventricular Arrhythmias

EPINEPHRINE:

ACTION: stimulate alpha + **beta adrenergic receptors**
= **relaxes** ♥ + **lung** smooth muscle + **dilation** of vessels in skeletal muscle

USE FOR: bronchodilation in these cases:
1. **anaphylaxis**
2. hypersensitivity **reaction**
3. acute **asthma attack**

} Bronchoconstricts = **BAD**

chronic simple glaucoma

ATROPINE:

ACTION: **inhibits Ach** in **lung** smooth muscle + ♥ muscle
blocks SA node + AV node = ↑ HR

USE FOR: **decreasing** respiratory secretions
sinus **bradycardia**

WATCH FOR: **overdose** of anticholinergic drugs

NARCAN:

ACTION: **Treat overdose** of narcotic med

USE FOR: **opioid** induced **toxicity**
Respiratory depression
Neonates affected by narcotics given during labor

"WE ALL NEED SOMEBODY TO LEAN ON"

ISO, HYPO, AND HYPERTONIC FLUIDS

GOAL: Replace lost fluids from dehydration, shock, hemorrhage, burns, etc.

REMEMBER: The **WATER** goes where the **SALT** flows

ISOTONIC

EQUAL concentration of SOLVENT and SOLUTE

TISSUE CELLS →

TYPES:
- 0.9% Normal saline
- 5% Dextrose in water (D5W)
- 5% Dextrose in .225% saline
- Lactated Ringers → Good for preggo moms and burns

KEY: D5W turns into a hypo tonic solution (absorbs Dextrose)

USE: ↑ extracellular fluid
- Blood loss, Dehydration surgery, Burns

NURSES:
1. D5W is isotonic in the Bag, hypotonic in the body
2. LR → Burns + Preggo Mom
   - NOT liver impaired
   - NOT hyperkalemic

HYPOTONIC (LOW)

↓ concentration of SOLUTE in solution

SWELL

TYPES:
- 0.45% NS (1/2 NS)
- 0.225% saline (1/4 NS)
- 0.33% saline (1/3 NS)

KEY: watch for cell lysis → TOO BIG they will burst

Watch for depletion of circulatory system

USE: Rehydrate cells
- Dehydration
- DKA / HHS
- NOT for ↑ ICP, burns or Trauma!

NURSES:
1. Give SLOWLY to prevent cellular edema
2. Risk of Hypovolemia Tachy, ↓BP, cellular edema / damage

HYPERTONIC (HIGH)

↑ concentration of SOLUTE in solution (SALTY)

SHRINK

TYPES:
- 3% saline
- 5% saline
- 10% Dextrose
- 5% Dextrose in 0.9% NS
- 5% Dextrose in 0.45% saline
- 5% Dextrose in LR

KEY: very hard on the vein very concentrated → give via central line

USE: Hypovolemia
Hyponatremia
cerebral edema

TOO MUCH = PULMONARY EDEMA

NURSES:
1. Give slowly (hard on vein)
2. Watch fluid overload bounding pulses, JVD crackles, edema

KEY: Dextrose is sugar!
- DO NOT give to hyperglycemic patients

LACTATED RINGERS has potassium!
- DO NOT give to liver impaired or hyperkalemia

COMMON MEDICATION ANTIDOTES

NEED TO KNOW

- ACETAMINOPHEN → N-ACETYLCYSTEINE (MUCOMYST)
- ANTICHOLINERGICS → PHYSOSTIGMINE
- ASPIRIN → SODIUM BICARBONATE
- BENZODIAZEPINE → FLUMAZENIL
- MAGNESIUM SULFATE → CALCIUM GLUCONATE
- CARBON MONOXIDE POISON → OXYGEN
- COUMADIN / WARFARIN → VITAMIN K
- DIGOXIN → DIGIBIND OR DIGIFAB
- HEPARIN → PROTAMINE SULFATE
- INSULIN REACTION → GLUCAGON
- OPIOID / NARCOTICS → NALOXONE (NARCAN)
- POISONING → ACTIVATED CHARCOAL
- IRON → DEFEROXAMINE

MEDICATION DOSAGE AND CALCULATIONS

LIQUID

1oz = 30mL
1oz = 2 Tbsp
1 Tbsp = 3 tsp
1 Tbsp = 15mL
1 tsp = 5mL
8oz = 1 cup
1 pint = 16oz

MASS

mcg → mg → g → kg (÷ by 1000)
mcg ← mg ← g ← kg (x by 1000)
lb. → kg (÷ by 2.2)
kg → lb. (x by 2.2)

SOLID

1 kg = 2.2 lb.
1 in = 2.54 cm

TIME

min → hr (÷ by 60)
hr → min (x by 60)

VOLUME

mcl → ml → L → kl (÷ by 1000)
mcl ← ml ← L ← kl (x by 1000)
1 mL = 1cc
1 mL = 15 gtts

TIP: When you hear the word "gram" think of pennies (smaller units) and when you hear "kilogram" think of a dollar bill (larger unit). 100 pennies fit *into* a dollar bill, so think about grams fitting *into* kilograms aka grams are smaller than kilograms. We can also think that kilograms are bigger than grams because we weight adults in kilograms and that's *heavy*.

COMMON CALCULATIONS

BASIC CALCULATIONS:

$$\frac{\text{ordered}}{\text{available}} \times \text{volume} = \text{dose}$$

KEY
- If >0.5, ROUND UP
- DO NOT FORGET PROPER LABELING!

TABLET DOSAGES:

$$\frac{\text{desired dosage}}{\text{available}} = \text{\# of tablets}$$

MIXTURES AND SOLUTIONS: (bolus or push)

$$\frac{\text{desired dosage}}{\text{available}} \times \text{stock volume} = \text{amount of solution given}$$

IV RATE:

1. mL per hr *or* min → $\frac{\text{total IV volume}}{\text{total time (hr or min)}}$ = mL/hr *or* min

2. gtt/min → $\frac{\text{total IV volume}}{\text{time (minutes)}} \times \text{drop factor}$ = gtt/min

Drop factor will be given

3. Remaining time of infusion → $\frac{\text{volume remaining (mL)}}{\text{gtt}} \times \text{drop factor}$ = minutes remaining

4. Flow rate → $\frac{\text{ordered per hour}}{\text{medication available}} \times \text{volume (mL)}$ = mL/hr

5. Flow rate → $\frac{\text{ordered per hour} \times \text{kg}}{\text{medication available}} \times \text{volume (mL)}$ = mL/hr

KEY: This formula is for *hours*. If you are given *minutes*, simply multiply by 60

PRACTICE

(Answers at end of sheet)

1. **Administer heparin 5,000 units I.V. push. Available is heparin 10,000 units/mL. How many mL will you need to administer to achieve a 5,000 unit dose?**
   Hint: Use *Basic Calculation* formula

2. **A patient is prescribed Coumadin 5mg tablets for home. After his most recent international normalized ratio (INR), the doctor calls and tells him to take 7.5mg/day. How many tablets (scored) should the patient take?**
   Hint: Use *tablets* formula

3. **The physician orders alprazolam 0.25mg PO. You have on hand alprazolam 0.125mg tablets. How many tablets will you give?**
   Hint: Use *tablets* formula

4. **The MD writes an order for Dilantin 100mg by mouth daily. Pharmacy dispenses you with 0.5 grams per capsule of Dilantin. How many capsules do you administer per dose?**
   Hint: Use *tablets* formula

5. **Phenytoin 0.1g PO is ordered to be given through an NG tube. Phenytoin is available as 30mg/5mL. How many mL will the nurse administer?**
   Hint: Use *mixtures & solutions* formula

6. **The physician order 375mg of Cefuroxime for the patient. The drug is available in 750mg vials. You plan to dilute it in 10mL of sterile water. How many mL should you give to your patient?**
   Hint: Use *mixtures & solutions* formula

7. **Heparin 20,000 units in 500 mL D5W is infusing at 20 mL/hour. At how many units/hour is the heparin infusing?**
   Hint: Use *IV Rate ml/hr* formula

8. **The nurse will infuse 1000mL over the next 10 hours by IV infusion pump. What is the IV infusion rate in per hour?**
   Hint: Use *IV Rate mL/hr* formula

9. **A diabetic is to receive an infusion of insulin at 12 units/hr. The nurse prepares a 250mL bag of NS with 100 units of regular insulin. What is the infusion rate in mL/hr?**
   Hint: Use *IV Rate mL/hr* formula

10. **You have an IVPB of Ranitidine 50mg in 50mL of D5W. The order is to be run over 30 minutes with a drop factor of 15gtt/mL. How many drops per minute (gtt/min) will you set on the IV pump?**
    Hint: Use *IV Rate gtt/min* formula

11. Calculate the drops per minute (gtt/min) using an administration set with a drop factor of 10gtt/mL.
Hint: Use *IV Rate gtt/min* formula

a. IV of D5W at 125mL/hr

b. IV of D5W with 20mEq of KCl at 100mL/hr

12. A patient has a primary IV of dextrose in water 1,000 mL to be infused over 24 hours. What would be the drip rate (gtts/min) using tubing with a drop factor of 60? Round to a whole number.
Hint: Use *IV Rate gtt/min* formula

13. The physician orders a 500mL bag of IV NS to be infused at 20gtt/min. The drop factor is 10gtt/mL. You start the IV infusion at 0500. At what time will the infusion be complete?
Hint: Use *Remaining Time of Infusion* formula

14. A patient is to receive Lidocaine at 3mg/min. Supplied is a one liter bag of D5W containing 4g of Lidocaine. Calculate the flow rate in mL/hr.
Hint: Use *Flow Rate mL/hr* formula

15. The physician orders Nipride 3mcg/kg/min to keep SBP <140mmHg. The pharmacy supplies this in a 250mL bag of D5W that contains 50mg of the drug. The patient weighs 56kg. Calculate the dosage in mcg/min and flow rate in mL/hr.
Hint: Use *Flow Rate mL/hr* formula

16. The nurse needs to administer Furosemide 2 mg/minute via continuous IV infusion. Pharmacy has sent a bag of Lasix 400mg diluted in D5W 250mL. How many mL/hour will you set on the controller?
Hint: Use *Flow Rate mL/hr* formula

ANSWERS

1. **Administer heparin 5,000 units I.V. push. Available is heparin 10,000 units/mL. How many mL will you need to administer to achieve a 5,000 unit dose?**
   Hint: Use *Basic Calculation* formula

ORDER: 5000 units
AVAILABLE: 10,000 units/mL

$$\frac{5000\ \text{units}}{10{,}000\ \text{units}} \times 1\text{mL} = 0.5\text{mL/dose}$$

2. **A patient is prescribed Coumadin 5mg tablets for home. After his most recent international normalized ratio (INR), the doctor calls and tells him to take 7.5mg/day. How many tablets (scored) should the patient take?**
   Hint: Use *tablets* formula

O: 7.5 mg/day
A: 5mg tablets

$$\frac{7.5\text{mg tablet}}{5\text{ mg tablet}} = 1.5\text{ tablets/dose}$$

3. **The physician orders alprazolam 0.25mg PO. You have on hand alprazolam 0.125mg tablets. How many tablets will you give?**
   Hint: Use *tablets* formula

O: 0.25 mg tablets
A: 0.125 mg tablets

$$\frac{0.25\text{mg}}{0.125\text{mg}} = 2\text{ tablets/dose}$$

4. **The MD writes an order for Dilantin 100mg by mouth daily. Pharmacy dispenses you with 0.5 grams per capsule of Dilantin. How many capsules do you administer per dose?**
   Hint: Use *tablets* formula

O: 100mg capsule
A: 0.5g capsule
↖ we need to convert!

① $0.5\text{g} \times \frac{1000\text{mg}}{1\text{g}} = 500\text{mg}$ capsules available

② $\frac{100\text{mg}}{500\text{mg}} = 0.2\text{ capsules/dose}$

* Yes, I know you cant have 0.2 of a capsule, but its just for practice purposes :)

5. **Phenytoin 0.1g PO is ordered to be given through an NG tube. Phenytoin is available as 30mg/5mL. How many mL will the nurse administer?**
   Hint: Use *mixtures & solutions* formula

O: 0.1g
A: 30mg/5mL

① $0.1\text{g} \times \frac{1000\text{ mg}}{1\text{g}} = 100\text{mg}$

② $\frac{100\text{mg}}{30\text{mg}} \times 5\text{mL} = 16.7\text{mL}$

6. **The physician order 375mg of Cefuroxime for the patient. The drug is available in 750mg vials. You plan to dilute it in 10mL of sterile water. How many mL should you give to your patient?**
Hint: Use *mixtures & solutions* formula

O: 375 mg
A: 750mg
Dilute: 10mL

$$\frac{375\cancel{mg}}{750\cancel{mg}} \times 10mL = 5mL$$

7. **Heparin 20,000 units in 500 mL D5W is infusing at 20 mL/hour. At how many units/hour is the heparin infusing?**
Hint: Use *IV Rate ml/hr* formula

O: $\frac{20{,}000 \text{ units}}{500 \text{ mL D5W}}$
Infusion: 20mL/hr

① Find how many units/mL

$$\frac{20{,}000 \text{ units}}{500 \text{ mL D5W}} = 40 \text{ units/mL}$$

② Find how many units/hr

$$40 \text{ units} \times 20mL = 800 \text{ units/hr}$$

$$\frac{40 \text{ units}}{\cancel{mL}} \times \frac{20\cancel{mL}}{hr}$$

8. **The nurse will infuse 1000mL over the next 10 hours by IV infusion pump. What is the IV infusion rate in per hour?**
Hint: Use *IV Rate mL/hr* formula

O: 1000mL in 10 hours

$$\frac{1000 \text{ mL}}{10 \text{ hours}} = 100 \text{ mL/hr}$$

9. **A diabetic is to receive an infusion of insulin at 12 units/hr. The nurse prepares a 250mL bag of NS with 100 units of regular insulin. What is the infusion rate in mL/hr?**
Hint: Use *IV Rate mL/hr* formula

O: 12 units/hr
A: $\frac{100 \text{ units}}{250 \text{ mL}}$

$$\frac{12 \cancel{\text{units}}/hr}{100 \cancel{\text{units}}} \times 250 \text{ mL} = 30mL/hr$$

you can also set up like this:

$$\frac{12 \cancel{\text{units}}}{hr} \times \frac{250 \text{ mL}}{100 \cancel{\text{units}}} = 30mL/hr$$

10. **You have an IVPB of Ranitidine 50mg in 50mL of D5W. The order is to be run over 30 minutes with a drop factor of 15gtt/mL. How many drops per minute (gtt/min) will you set on the IV pump?**
Hint: Use *IV Rate gtt/min* formula

O: $\frac{50 \text{ mg Ranitidine}}{50 \text{ mL D5W}}$
Rate: 30 min
Gtt: 15gtt/mL

$$\frac{50\cancel{mL}}{30 \text{ minutes}} \times \frac{15gtt}{\cancel{mL}} = 25 \text{ gtt/min}$$

11. **Calculate the drops per minute (gtt/min) using an administration set with a drop factor of 10gtt/mL.**
Hint: Use *IV Rate gtt/min* formula

a. **IV of D5W at 125mL/hr**

ROUND UP! ü

$$\frac{125\,mL}{60\,min} \times \frac{10\,gtt}{mL} = 20.8333 \rightarrow 21\,gtt/min$$

b. **IV of D5W with 20mEq of KCl at 100mL/hr**

$$\frac{100\,mL}{60\,min} \times \frac{10\,gtt}{mL} = 17\,gtt/min$$

Remember: 20mEq is NOT the Total volume! 100mL is! ü

12. **A patient has a primary IV of dextrose in water 1,000 mL to be infused over 24 hours. What would be the drip rate (gtts/min) using tubing with a drop factor of 60? Round to a whole number.**
Hint: Use *IV Rate gtt/min* formula

① $\frac{1000\,mL}{24\,hours} = 42\,mL/hour$

② $\frac{42\,mL}{60\,min} \times \frac{60\,gtt}{mL} = 42\,mL/min$

13. **The physician orders a 500mL bag of IV NS to be infused at 20gtt/min. The drop factor is 10gtt/mL. You start the IV infusion at 0500. At what time will the infusion be complete?**
Hint: Use *Remaining Time of Infusion* formula

O: 500mL NS at 20gtt/min
Drop Factor: 10gtt/mL

$$\frac{500\,mL}{20\,gtt/min} \times \frac{10\,gtt}{mL} = 250\,min$$

Started at 0500
↓
End at 0910

14. **A patient is to receive Lidocaine at 3mg/min. Supplied is a one liter bag of D5W containing 4g of Lidocaine. Calculate the flow rate in mL/hr.**
Hint: Use *Flow Rate mL/hr* formula

O: 3mg/min
A: $\frac{4g}{1L\ D5W}$ OR $\frac{4g}{1000mL}$

you can do it this way...

$$\frac{3mg}{min} \times \frac{1g}{1000mg} \times \frac{1000mL}{4g} \times \frac{60min}{1hr} = 45mL/hr$$

OR you can follow the formula on the other page:

① $4g \times \frac{1000mg}{1g}$ → ② $\frac{3mg}{4000mg} \times 1000mL \times 60min = 45mL/hr$

15. **The physician orders Nipride 3mcg/kg/min to keep SBP <140mmHg. The pharmacy supplies this in a 250mL bag of D5W that contains 50mg of the drug. The patient weighs 56kg. Calculate the dosage in mcg/min and flow rate in mL/hr.**
Hint: Use *Flow Rate mL/hr* formula

O: 3mcg/kg/min
A: $\frac{50\text{mL Nipride}}{250\text{mL D5W}}$
Wt: 56kg

(1) $3\text{mcg} \times \frac{1\text{mg}}{1000\text{mcg}} = 0.003\text{mg/min}$

(2) following the formula: $\frac{0.003\text{mg} \times 56\text{kg}}{50\text{mg}} \times 250\text{mL} \times 60\text{min} =$ 50.4 = 50mL/hr

OR you can do it this way! $\frac{3\text{mcg}}{\text{kg/min}} \times 56\text{kg} = \frac{168\text{mcg}}{\text{min}} \times \frac{1\text{mg}}{1000\text{mcg}} \times \frac{250\text{mL}}{50\text{mg}} \times 60 =$ 50mL/hr

16. **The nurse needs to administer Furosemide 2 mg/minute via continuous IV infusion. Pharmacy has sent a bag of Lasix 400mg diluted in D5W 250mL. How many mL/hour will you set on the controller?**
Hint: Use *Flow Rate mL/hr* formula

O: 2mg/min
A: $\frac{400\text{mg Lasix}}{250\text{mL D5W}}$

convert:
(1) $\frac{2\text{mg}}{\text{min}} \times \frac{60\text{min}}{1\text{hr}} = 120\text{mg/hr}$

use formula:
(2) $\frac{120\text{mg}}{400\text{mg}} \times 250\text{mL} =$ 75mL/hr

OR you can wait to multiply the 60 min at the end :)

MATERNITY BUNDLE

SIGNS OF PREGNANCY

PRESUMPTIVE:
VERY SUBJECTIVE
can be attributed to another diagnosis

- **Absent period** (Amenorrhea)
- Fatigue, Nausea, vomiting
- **Enlarged breasts**
- Urinary frequency
- "fluttering" movement (Quickening)
  typically felt at the 16-20wk mark

PROBABLE:
signs that point more towards pregnancy
"It is highly likely that you're pregnant"

- Positive pregnancy test
- Braxton Hicks contractions
- **Goodell's sign** → softening of the cervix ~8WKS
- **Chadwick's sign** → bluish discoloration of cervix, vagina, or vulva ~6-8WKS
- **Hegar's sign** → softening of the lower uterine segment ~6-12WKS
- Enlarged uterus OR enlarged abdomen
- Outline of fetal body felt by doctor (**HINT:** may **NOT** always be a fetus felt)

POSITIVE:
DEFINITIVE
unmistakable signs of pregnancy

- Fetal **Heart Rate** → Heard by the Doppler
- Fetal **movement** → **ONLY** movement felt by the provider
- Fetal **visualization** via ultrasound
- Delivery of baby

NAEGLE'S RULE AND PRACTICE!

WHAT IS IT? calculation used for estimating the expected due date (EDD) based on a woman's last menstrual period

- Does not count for leap years
- Average pregnancy lasts 280 days (9 calendar months)
  - In nursing, we dont go by months, we care more about weeks
  - 40WKS = FULL TERM
  - Lunar months (28days) THINK: menstrual cycle is measured by 28 days
    - ↓ 10 Total months = 40WKS

TRIMESTERS:
- 1st: 1-13WKS
- 2nd: 14-27WKS
- 3rd: 28-Delivery

NAEGLE'S RULE:

① First Day of Last Menstrual Period → ② Subtract 3 months → ③ Add 7 days → ④ Add a year if needed (April-Dec)

N	A	E	G	L	E	S
1	2	3	4	5	6	7

Ex: LMP: June 15th, 2020 − 3 months → March 15th, 2020 + 7 days → March 22nd, 2020 + 1 year → EDD: March 22nd, 2021

PRACTICE:

1. LMP: October 4th, 2020

2. LMP: June 16th, 2020

3. LMP: April 20th, 2020

4. LMP: January 13th, 2020

5. LMP: November 1st, 2020

*ANSWERS at end of bundle :)

GRAVIDITY, PARITY, GTPAL + PRACTICE

GRAVIDITY: # of times a woman has been pregnant

KEY POINTS:
1. The outcome is irrelevant (it does not matter the status of the baby - we are counting solely pregnancies)
2. This includes CURRENT pregnancy
3. We are counting ONLY pregnancies — NOT the # of babies

PARITY: # of times mom has given birth to a baby ≥ 20 WEEKS

1. This includes ALL babies ≥20WKS that are living or stillborn
2. We are counting ONLY pregnancies — NOT the # of babies

RECORDING GP SYSTEM: G2P1 OR G1P0

RECORDING 5-DIGIT SYSTEM:

GTPAL:
- G → Gravidity → same as above
- T → Term Births (>37+ weeks)
- P → PreTerm Births (20-37 weeks)
- A → Abortion or Miscarriage (<20 weeks)
- L → Living children

THIS INCLUDES ALIVE + STILLBORN WITHIN THESE WEEKS (Term and PreTerm Births)

ALL CHILDREN COUNT INDIVIDUALLY!! (Living children)

KEY: for T, P, & A: TWINS, TRIPLETS, ECT. COUNT AS ONE BIRTH

NULLI = NONE
PRIMI = FIRST
MULTI = MULTIPLE

PRACTICE:

1. **A woman who has never been pregnant is termed as ____?**

2. **A woman who states she has never given birth before or never completed a pregnancy >20 weeks is termed as _____?**

3. **How would you describe the term "multigravida?"**

4. **A 30-year-old patient gives birth to twins at 39 weeks gestation. This is her first pregnancy. What is her gravidity and parity?**

5. The patient states that she has been pregnant 6 times and has delivered 3 babies at 38, 39, and 40 weeks. She reports losing 3 children at 6, 6, and 7 weeks. She is currently 16 weeks pregnant. What is her gravidity and parity?

6. A 19-year-old female who is pregnant for the 2nd time with a history of 1 termination at 9 weeks. What is the GP? GTPAL?

7. Mary is 6 weeks pregnant. Her previous two pregnancies ended in a live birth at 41 weeks. What is the GP? GTPAL?

8. A 28-year-old female who is pregnant for the 4th time with one delivery to term, one miscarriage at 16 weeks, and twins delivered pre-term. What is the GP? GTPAL?

9. A 27-year-old female is 16 weeks pregnant. She has two-year-old twins that were born at 39 weeks and a 5-year-old that was born at 40 weeks gestation. She has no history of miscarriage or abortion. What is the GP? GTPAL?

10. Susan is experiencing her 4th pregnancy. Her first pregnancy ended in a spontaneous abortion at 8 weeks. Her second pregnancy ended in a cesarean section of twin boys at 38 weeks. Her third pregnancy ended in a cesarean section of her daughter at 34 weeks. What is the GP? GTPAL?

*ANSWERS at end of bundle ü

MATERNAL CHANGES + HORMONES

WEIGHT GAIN
- in general, 2-4lbs in the first 3 months
  THINK: 2-3-4
- 1lb a week during rest of pregnancy

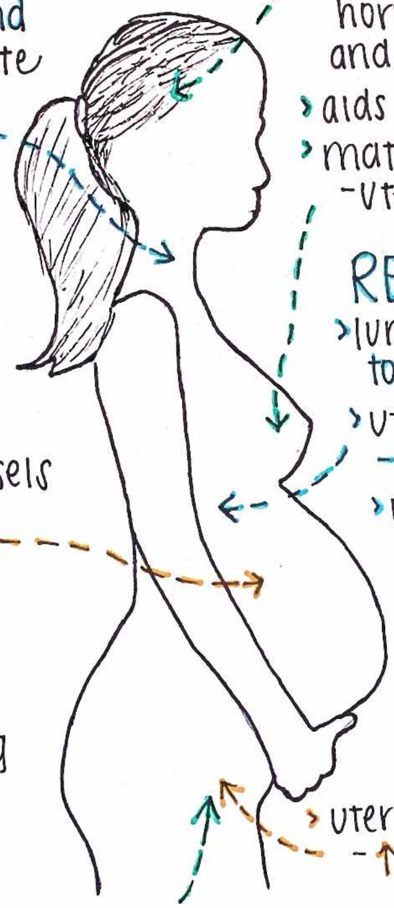
HCG
- stimulate estrogen + progesterone production via corpus luteum to maintain pregnancy before placenta is formed!

Also used in pregnancy test!

PROGESTERONE
- maintains endometrium
- inhibits contractions → GOOD!
- aids in duct development for lactation
- ↓ smooth muscle tone = constipation, heartburn, varicose veins

ESTROGEN
- suppress FSH + LH → these two hormones stimulate ovulation and we dont need that
- aids in growth of fetal organs
- maternal tissue growth
  - uterus, breasts, genitals

ANTERIOR PITUITARY
- stimulates thyroid gland
  ↳ ↑ mom's metabolic rate
- ↑ appetite
  ↑ metabolism



CIRCULATORY
- ↑ blood volume by 1-2Liters for baby
- ↓ in BP and HR↑
- growing uterus + baby compress pelvic blood vessels = varicose veins

RESPIRATORY
- lungs are working twice as hard to oxygenate all the extra blood
- uterus pushes up on diaphragm
  - SOB in later trimester
- uterus also pushes on stomach
  - Gastric reflux or ulcers

SKIN
- striae (stretch marks)
- linea negra (brown pigmentation line along stomach)

PROLACTIN
- prepares breast for lactation
  THINK: "LACTATE"

- uterus puts pressure on bladder
  - ↑ urinary frequency

OXYTOCIN
- CAUSES CONTRACTIONS but is inhibited by progesterone during pregnancy
- aids in milk ejection during breastfeeding

GESTATIONAL DIABETES — CRASH COURSE

WHAT IS IT? A type of diabetes that occurs during pregnancy typically in the 2nd or 3rd Trimester

PATHOPHYSIOLOGY:

NORMAL → Pancreas secretes insulin via beta cells
↓
- insulin influences the cells receptiveness to glucose.
- This will allow cells to take in glucose that is hanging out in the blood

↓

IN PREGNANCY → There are changes to insulin sensitivity
- The body becomes more resistant to insulin so there is more glucose for the baby
- This is usually not an issue → the body will compensate for extra glucose

↓
- sometimes the pancreas cant manage the demand increase

↓

GDM → Blood sugar levels rise TOO HIGH.. There isnt enough insulin to create energy.
- similar to Type 2 DM
- diagnosed in the 2nd or 3rd Trimester (screening at 24-28 WKS)
- NOT PERMANENT – blood sugar will return to normal
- ↑ RISK of mom developing diabetes later on

RISK FACTORS:

- Maternal Age > 25
- Overweight or obese (BMI >25) (BMI >30)
- Macrosomia (Large baby) history
- Multiple pregnancy (twins, etc.)
- Hx of GDM, FHx of DM

S/S OF GDM:

- Polyphagia (excessive hunger)
- Polyuria (excessive urination)
- Polydipsia (intense thirst)
- Glucose in the urine
- Dry mouth, fatigue
- Frequent UTI or yeast infections

NURSING CARE:

- screening 24-28 WKS ↗ 1hr oral glucose test
  - no fasting
  - blood draw 1hr later
- Encourage diet + exercise
- Glucose checks DAILY
- Assess urine for glucose (burning?)
- Monitor glucose during + after labor!
  - may need IV insulin or glucose
- Monitor for hypoglycemia
  - Mom - cold, clammy, sweaty, preeclampsia
  - Baby - Resp. Problems, poor feeding, shaking
- Postpartum → 6-12hr after delivery mom should have a glucose test
- Educate regular Diabetic Testing due to RISK of Type 2 DM!! (q1-3years)

MATERNAL NUTRITIONAL NEEDS

WEIGHT GAIN:

- in general: 2-4 lbs in the first 3 months
  THINK: 2-3-4
- 1lb a week during rest of pregnancy
- TOTAL for normal weight mom (BMI: 18.5-24.9) = 25-35lbs

CALORIES:

- may need an additional 300-500 calories per day to provide extra energy for baby
  - may vary depending on mom's BMI
- DO NOT RESTRICT CALORIES → baby is growing!
- DO NOT RESTRICT SODIUM → maintains fluids
- EX. of good calories: complex carbs
  - cereals, grains, rice, potatoes, veggies
  - digested slowly to regulate insulin + glucose

PROTEIN:

- need at least 60 grams per day to provide nutrients for baby growth and tissue growth
  - also helps in growth of placenta, uterus, breasts and ↑ blood supply

EX: meat, milk, poultry, fish

KEY: AVOID fish with high mercury levels (shark, swordfish, King Mackeral)

HINT: Vitamin B12 is in animal protein, so inadequate protein = inadequate Vit. B12

VITAMINS:

IRON → used to make extra blood for mom and baby
normal → >11g at beginning + end of pregnancy
10.5g is okay in middle of pregnancy

CALCIUM → bone + teeth formation
GOAL → 1,000mg / day

VITAMIN A → intake is usually adequate, No need for additional
TOO MUCH: birth defects
TOO LITTLE: poor night vision
fruits + veggies

VITAMIN D → Needed for calcium absorption!
TOO LITTLE: diminished fetal + maternal bone density

FOLIC ACID: (400MCG)

- A prenatal vitamin! or found in fortified foods, fruits + veggies
- HIGHLY recommended when trying to conceive → should be taken 2-3 months BEFORE conception AND first 12 WKS of pregnancy
- used to prevent neural tube defects and make RBC's

CAFFEINE: Less than 200mg per day

TOO MUCH: ↑ RISK low birth weight, preterm delivery, growth restriction

PICA: cravings for strange foods → starch, clay, DIRT

- ↑ RISK preterm delivery

Rh INCOMPATABILITY

PATHOPHYSIOLOGY:

All blood cells have an Rh Factor (positive or negative)

- Presence of Rh factor protein on the cell = **POSITIVE**
- No Rh factor protein on the cell = **NEGATIVE**

IN PREGNANCY: Main problem are moms that are Rh(-)

1. 1st pregnancy: mom is Rh(-), dad is Rh(+) } baby is Rh(+)

⇓

2. Mom's red blood cells dont match up with baby's during birth
   - HINT: during birth, mom + baby's blood can mix

⇓

3. Mom's body recognizes the Rh protein as foreign
   - Mom's blood makes antibodies to the Rh protein
   - **AKA mom is now SENSITIZED**

*** Rh antibodies are HARMLESS until the 2nd or later pregnancies ***

1. 2nd Pregnancy: mom is carrying another Rh(+) child

⇓

2. Mom's antibodies recognize the foreign cells and **ATTACK**
   - antibodies will pass into baby's bloodstream and cause **hemolysis**

⇓

3. This causes baby to have:
   - **↓RBC** = $\downarrow O_2$ = severe anemia
   - **↑spleen + liver** (Theyre trying to make more RBC)
   - **Heart Failure** = lack of blood
   - **Jaundice** (hemolyzed RBC release billirubin
     - ↳ may cause Neuro issues

NURSING CONSIDERATIONS: GOAL: prevent momma from being sensitized!

1. **Assess blood type** of mom at **first prenatal visit**
   - **Rh(+)** → mom is fine and does not need immunization
     - DO NOT GIVE shot if (+)
   - **Rh(-)** → **RhoGAM** shot at **28WKS** + **72hours after delivery** (if baby turns out to be (+))
     - ↓ stops immune system from creating antibodies

2. **Coombs test – testing the blood of newborn baby for antibodies**
   - If positive → baby may develop **Jaundice** and **anemia**
     - Jaundice ↓ Tx: Phototherapy
     - anemia ↓ Tx: Folic acid = ↑RBC

THINK: "HONEYCOMB"
Yellow = Jaundice

FETAL DEVELOPMENT STAGES

PREEMBRYONIC STAGE: 0-2 WKS

Day 1: **conception** → sperm and ovum unite = **ZYGOTE**

Day 2-3: **zygote** spends these days traveling **down the fallopian tube** dividing many times to form a ball of cells = **MORULA**

Day 4-8: cells differentiate → form a **BLASTOCYST**:

- **inner** cells make up the **embryo**
- **outer** cells are **TROPHOBLASTS** and later form the **PLACENTA**

EMBRYONIC STAGE: 2-8 WKS

- when the **mass of cells** become distinct as a **human**

2-3WKS: **ECTODERM:** outer layer of skin, glands, hair follicles, nails, mucous membranes, mouth, anus

MESODERM: skin, bone, cartilage, muscles, blood vessels, kidneys

ENDODERM: linings of the trachea, pharynx, bronchi, GI + GU tract

ALSO: TROPHOBLASTS: **penetrate** the lining of the uterus **(aka Decidua)**

↳ Moms vessels will **dilate**

↳ Moms vessels will form around the villi to make a **strong placenta**

Plays a major role in preeclampsia

AMNIOTIC CAVITY (SAC):

- **chorion + amnion form** during implantation in the uterus **(day 8-14)**

↳ **chorion:** **outer layer** of membranes surrounding the amnion

amnion: **inner layer** of membranes that fills with fluid which causes it to expand into the amniotic sac

FETAL STAGE: 9 WKS-BIRTH

- in previous stages, every organ has **somewhat** be developed
- The organs **continue to develop** and prepare for extrauterine life

IMPORTANT WEEKS IN FETAL DEVELOPMENT

GREAT FOR NCLEX PREP

4 WKS → Heart begins to beat

8 WKS → All other organs have been somewhat formed

8-12 WKS → Heart tones heard on Doppler
To remember this, listen to Lady by Brett Young (0:23 sec)
- organs and tissues enter the maturation stage

16 WKS → Sex is visible on Doppler Ultrasound!
16-25 WKS - Baby's first movements (AKA Quickening)

20 WKS → HALFWAY POINT
- Quickening
- baby can practice breathing motions
- LANUGO covers whole body
- can hear in the uterus

24 WKS → Age of Viability - baby is able to survive outside of the womb
(we dont want this BUT they do have a fighting chance at survival)
- Fetal respiration movements at 10-20%
- 24-28 WKS - SURFACTANT production

32 WKS → Baby begins to settle down in the pelvis to prepare for birth

40 WKS → FULL TERM!!!

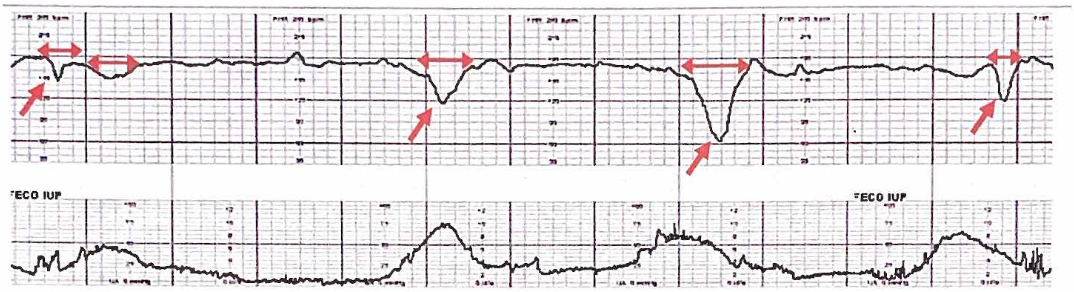
FETAL HEART TONES

Normal Fetal Heart Rate (FHR): 110-160 bpm

Expected: moderate variability + accelerations (may or may not be present)

* Top portion → FHR
  Bottom portion → uterine activity

VARIABLE DECELERATIONS: FHR "varies" in duration, intensity, and timing



THIS IS ALARMING

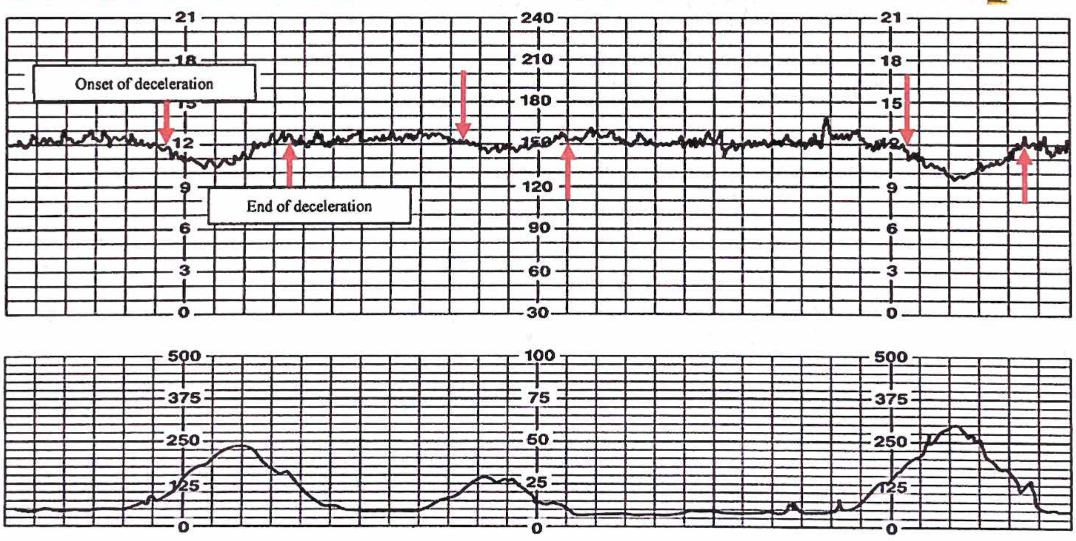
YES INTERVENTION NEEDED

CAUSES: umbilical cord compression

INTERVENTION: move position of mom → side lying will relieve pressure on cord & ↑ blood flow
› administer O_2
› discontinue Pitocin

THINK: variable have a "V" shape

EARLY DECELERATIONS: slowing of FHR DURING contractions



These are known to "mirror" mom's contractions (they dont technically come early)

NOT ALARMING

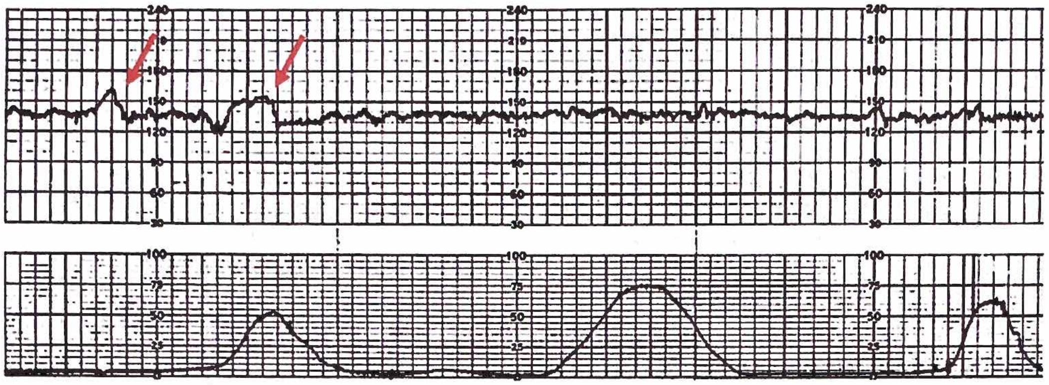
NO INTERVENTION NEEDED

CAUSES: compression of baby's head during contraction
› The head will be compressed entering the birth canal

INTERVENTION: continue to monitor
No intervention needed

FETAL HEART TONES ♥♥♥

ACCELERATIONS: a temporary increase in FHR above baseline



May be present or absent → NOT ALARMING

NO INTERVENTION NEEDED

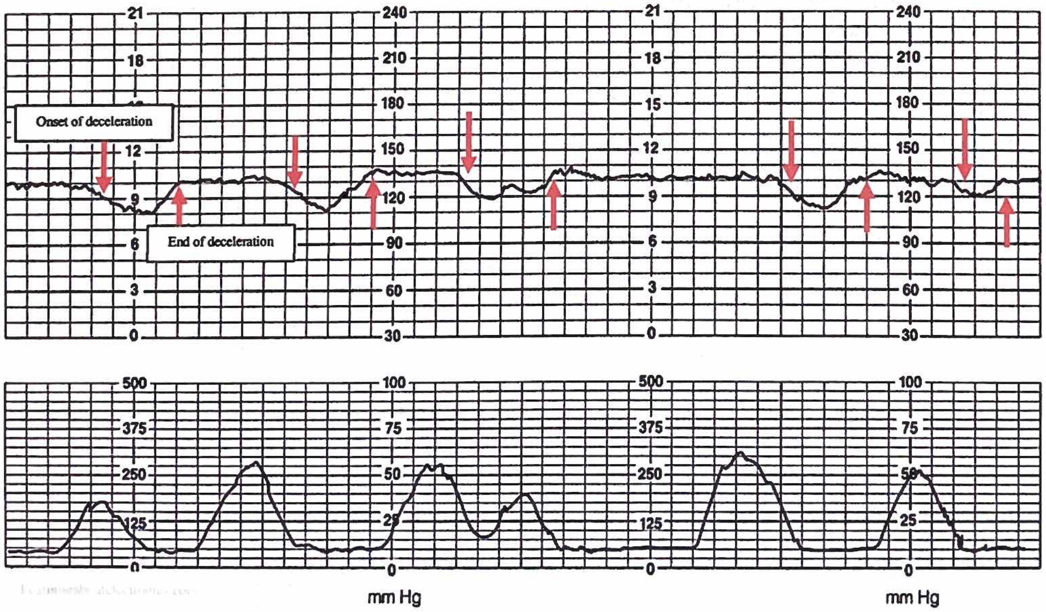
NOTE: A FHR >160 for at least 10 minutes is alarming
- › cause: maternal infection, cocaine, dehydration
- › TX: administer antipyretics, O_2 or IV fluids

] Prolonged acceleration

NORMAL: onset to peak of acceleration → <30seconds
duration → <2minutes

LATE DECELERATIONS: slowing of FHR AFTER contraction has started!

AND has a prolonged time before returning to baseline



THIS IS ALARMING

YES INTERVENTION NEEDED

CAUSES: uteroplacental insufficiency
decrease in uterine blood flow

INTERVENTION: Emergency delivery
- › place pt side lying
- › IV fluids, O_2
- › Discontinue oxytocin

FETAL HEART TONES MADE SIMPLE!

Fetal Heart Rate Pattern – VEAL	Cause – CHOP	Intervention - MINE
V – Variable Decelerations	**C** – Cord compression	**M** – mother needs to change positions o Side lying or knee-to-chest will relieve pressure on umbilical cord o Administer oxygen o Discontinue oxytocin
E – Early Decelerations	**H** – Head compression	**I** – Intervention not necessary (This is EXPECTED and should be present as the baby enters the birth canal)
A – Accelerations	**O** – Okay	**N** – No intervention necessary (Accelerations may be present or absent and is not considered alarming)
L – Late Decelerations	**P** – Placental insufficiency	**E** – Execute actions immediately o EMERGENCY DELIVERY o Place the patient side-lying o Administer IV fluids and oxygen o Discontinue oxytocin

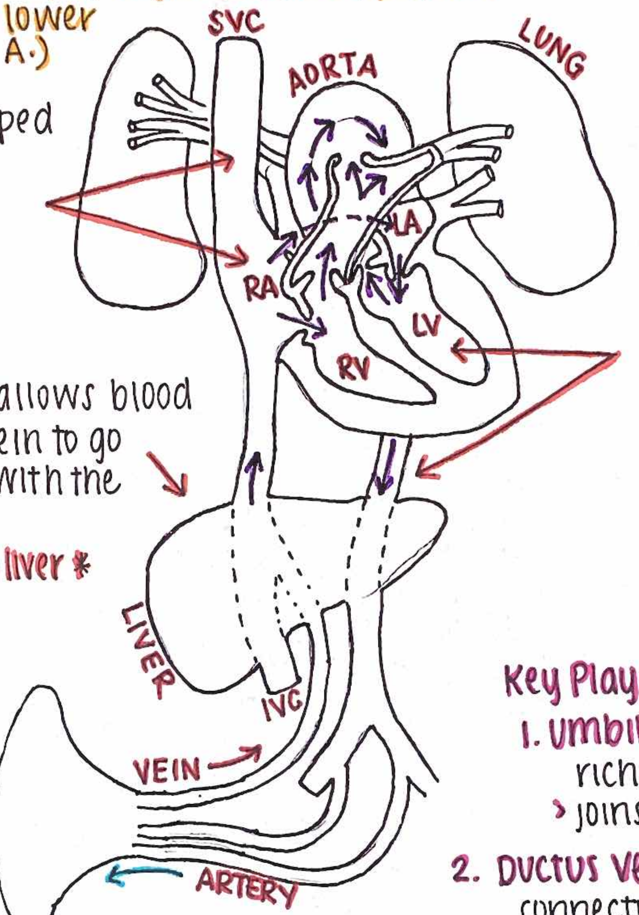
FETAL CIRCULATION

The ♥ bypasses the lungs via shunts

DUCTUS ARTERIOSIS: allows blood in the **pulmonary artery** to go straight to the **aorta**. (Too much pressure !!)

④ **SOME** blood goes into the **Right ventricle** → pulmonary artery → lungs → back to pulmonary vein → **left atrium**
MOST blood goes through the **FORAMEN OVALE** to the left atrium. **KEY: Right side has ↑ pressure so blood moves to lower pressure (left A.)**

⑤ From the **Left atrium**, blood moves to the **left ventricle**



③ **O_2 rich** blood is dumped into the **Right Atrium**
***Mixed with more blood** (deoxygenated) from the superior vena cava

⑥ Blood moves from **left ventricle** to the **aorta**
↓
distributes blood **all the way down** to the legs, internal iliac arteries **AND** the UMBILICAL **ARTERIES** to return to the **placenta**

② **DUCTUS VENOSUS:** allows blood from the umbilical vein to go through it to meet up with the inferior vena cava
*** some blood may go to liver ***

THE END

① **PLACENTA: lifeline between mom + baby "Temporary Lungs"**
› gives baby O_2 rich blood via **1 VEIN**
› takes deoxygenated blood + waste away from baby via **2 arteries**

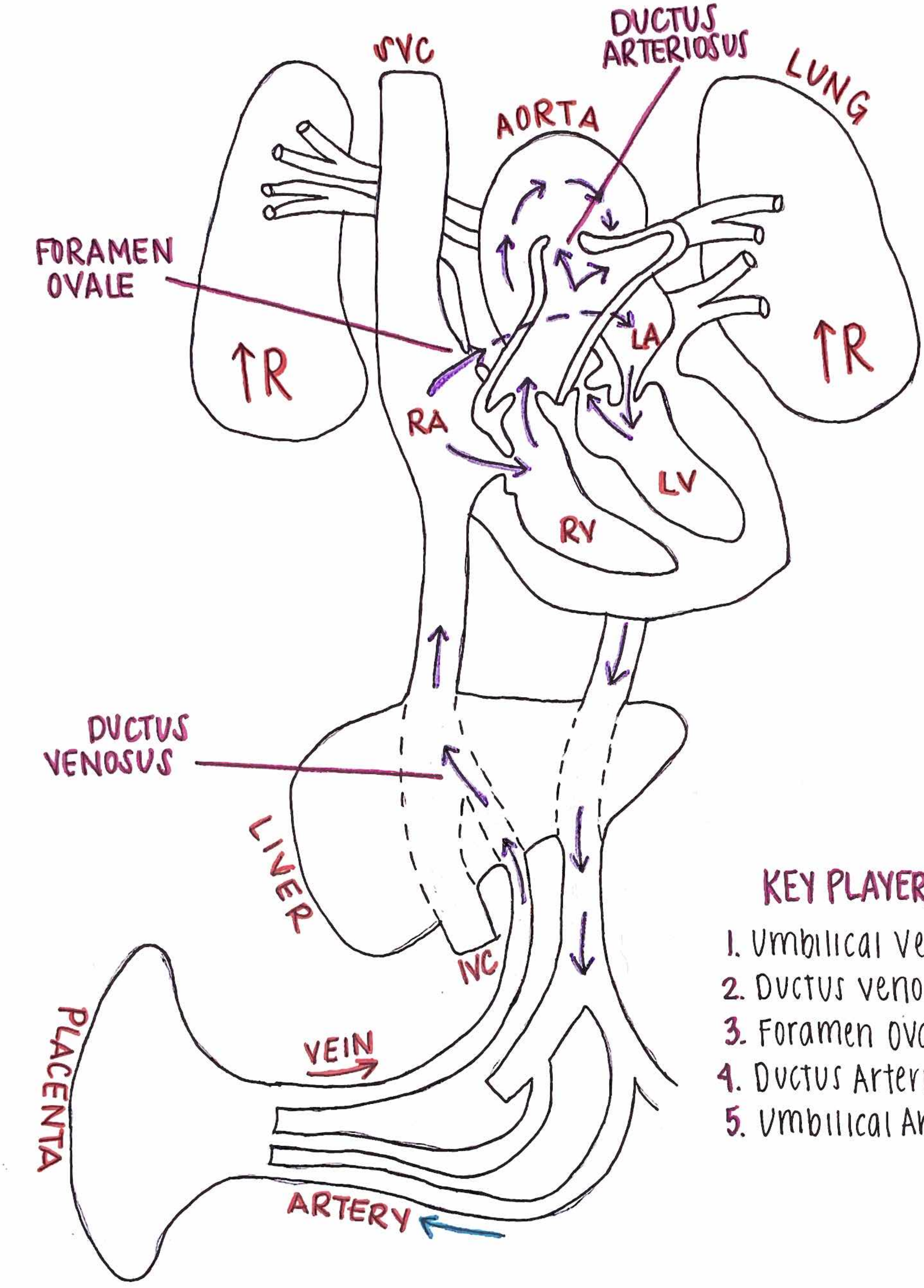
START

Key Players:

1. **Umbilical vein:** carry oxygen rich blood towards the liver area
   › joins with the inferior vena cava
2. **Ductus Venosus:** fetal blood vessel connecting the umbilical vein to the inferior vena cava
3. **Foramen Ovale:** shunts oxygen rich blood from R. Atrium to L. Atrium **(from ↑ pressure to ↓ pressure)**
4. **Ductus Arteriosus:** protects lungs against circulatory overload **(there's already so much pressure in the lungs)**
   › shunts blood from pulmonary artery to the aorta
5. **Umbilical Arteries (2):** carry oxygen poor blood back to placenta

AFTER BIRTH:

› umbilical cord **clamped**
› baby breathes on own → lungs start to **expand + pressure changes**
› foramen ovale and ductus arteriosus **CLOSE** (Hopefully!)



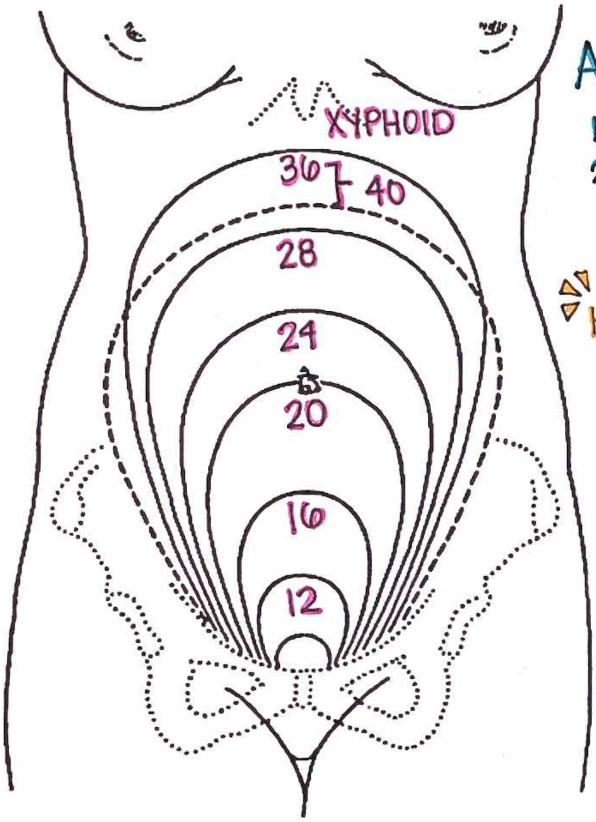
KEY PLAYERS:

1. Umbilical Vein (1)
2. Ductus venosus
3. Foramen ovale
4. Ductus Arteriosis
5. Umbilical Artery (2)

ASSESSING FUNDAL HEIGHT

WHAT IS IT? A type of **measurement** used to **measure the gestational age of the fetus** based on the **height of the fundus**
- **closely observed after delivery** to ensure adequate postpartum recovery

***Measure** from the **symphysis pubis to the fundus in centimeters**
1 fingerbreath = 1 centimeter



ASSESSMENT during Pregnancy:

1. Have the patient lie back **(NOT FLAT) → ↓ BP**
2. Measure at **beginning of symbysis pubis to fundus** (top of uterus)
   - **IN CENTIMETERS**

KEY: The **fundal height** typically **correlates** to the **gestational age** give or take **1-2cm**

EX: 24 cm = 24 weeks
29 cm = 29 weeks] This is less accurate in pt with high **BMI ≥ 30**

COMMON LANDMARKS:

- **12 WKS** – just above the symphysis pubis
- **12-20 WKS** – in between belly button and symph.
- **20-36 WKS** – fundal height matches gestational age (+/- 1-2cm)
- **36 WKS** – at the xyphoid process → up near the lungs so its hard to breathe
- **37-40 WKS** – fundal height DECREASES ~4CM! ♥ Preparing for birth ♥

AFTER BIRTH:

1. Make sure bladder is **empty!**
2. Have the pt lie **flat** on her back

KEY: always have **one hand at the base** of the **uterus** so when you palpate, the uterus doesnt **come out** of the vagina!

- immediate post delivery → **uterus** is felt at the **umbilicus**
- uterus will decrease **1 CM/day**
  EX: 24hrs postpartum → uterus is -1
- **10-14 days we can no longer palpate!** THIS IS GOOD

ALARMING:

- **"MEASURING BIGGER"** → **>3CM more** than expected
  cause: macrosomia
  multiple babies
  polyhydramnios
- **"MEASURING SMALLER"** → **<3CM than expected**
  cause: IUGR
  oligohydramnios
  gestational diabetes

6 WKS → prepregnancy size

TRUE vs FALSE LABOR

① TRUE LABOR : THINK: "TRUE"

T = timing of contractions
- ↑ in frequency, duration + intensity

R = Radiating discomfort
- begins in lower portion of back → radiates to abdomen
- vaginal pressure from the top of uterus downward

U = unable to relieve with activity
- contractions ↑ despite comfort measures

E = exam changes present
- ↑ cervical dilation + effacement

5-1-1 RULE:
- 5: contractions q5min
- 1: Duration: 1MIN
- 1: For 1 or more hours

→ GO TO HOSPITAL!!

② FALSE LABOR : THINK: "FAKE"

F = fails to cause cervical changes

A = activity HELPS contractions
- contractions ↓ with comfort measures

K = keep feeling discomfort in the same area
- lower abdomen + groin
- NO RADIATION

E = erratic timing of contractions
- irregular intervals
- no ↑ in frequency, duration or intensity
- can dissipate

→ **BRAXTON HICKS CONTRACTIONS!!**
- IRREGULAR
- Do not result in cervical change

BABY IS COMING IF:

1. Presence of amniotic fluid
2. Presence of bloody show → mucus plug
3. Nausea/Vomiting may occur with intensity

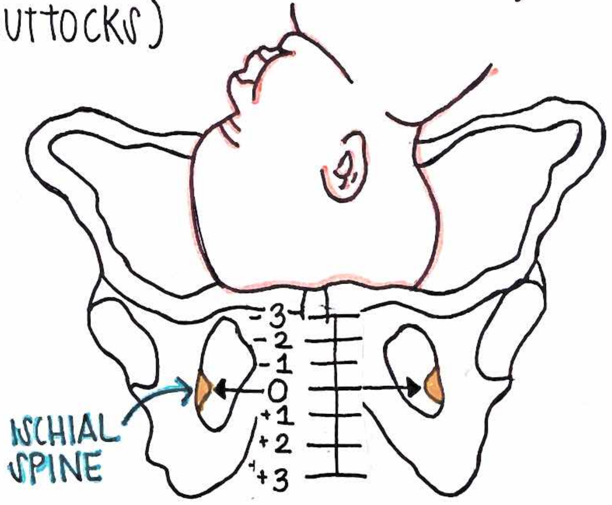
FETAL STATION

WHAT? A measurement of where the presenting part is located in relationship to the ischial spine

ISCHIAL SPINE: your point of reference to tell when the baby is ENGAGED with the mothers pelvis

PRESENTING PART: may not always be the head of the baby (shoulder, foot, buttocks)

HOW DO WE MEASURE?



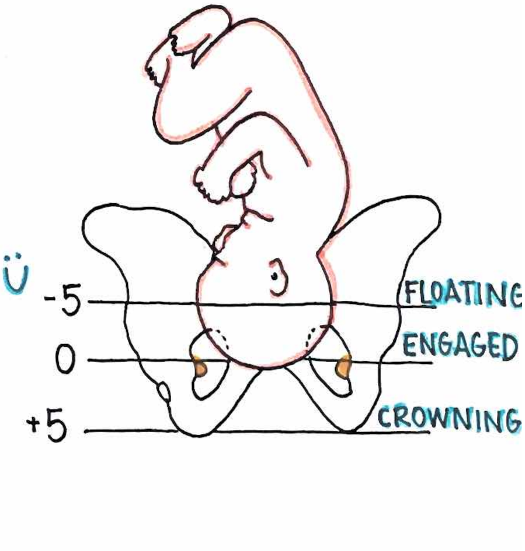
1. Look for the ischial spine
   - Bony prominence, can be felt in the pelvis
2. Document distance from the presenting part to the ischial spine
   - Documented in (+) or (−); NOT in centimeters but it is measured in cm

KEY: If the fetal presenting part is at the ischial spine → Fetal station = 0 → AKA BABY IS ENGAGED!!

- This can also be called "lightening" or "Dropping" → The baby literally "drops" into the pelvis

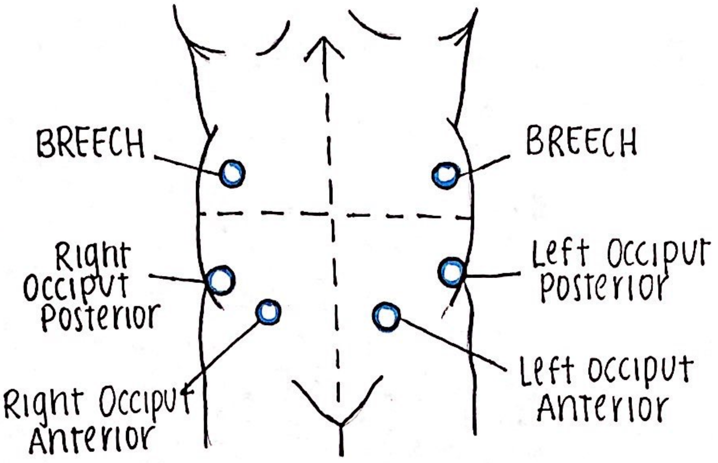
DOCUMENTING:

- (−) numbers = the baby is ABOVE the pelvis
  THINK: This is "negative" progress, we dont get to see baby yet :(
- (+) numbers = the baby is BELOW the pelvis
  THINK: Yay! This is positive progress to baby :)
- +4 and +5 = baby is coming really soon
- +5 = CROWNING → presenting part can be seen at mom's vaginal opening



HOW TO DETERMINE FETAL POSITION

2 WAYS: (1) Feeling the mothers abdomen → **LEOPOLD'S MANEUVER**
(2) **Auscultating** the abdomen to hear where fetal heartbeat is the strongest



(1) LEOPOLD'S MANEUVER:

Head: hard, round, moveable
Butt: soft, irregular, nonmoveable
Back: smooth, hard

(2) AUSCULTATION: →

FETAL HEART TONES

FOR TESTING

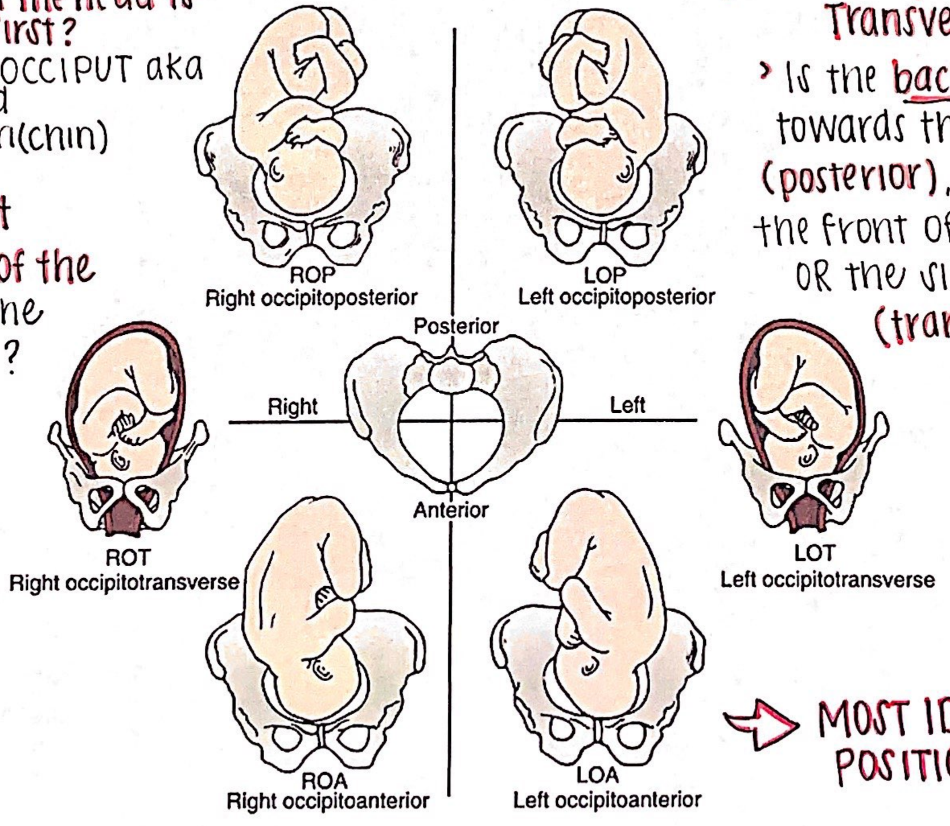
: There is no doubt you will be given a picture like this and you'll be asked what the fetal position is. **Here is how I do it:**

KEY: Always look at the **BACK of the head** when identifying left/right, anterior/posterior

② **What part of the head is coming out first?**
MOST COMMON: OCCIPUT aka back of head
OTHERS: Mentum (chin)

① **Right or Left**
› Is the **BACK of the head** facing the left or right?

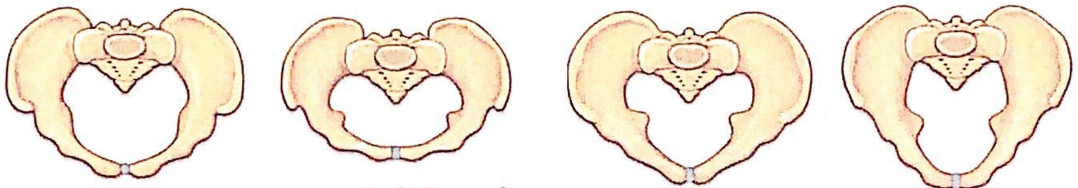
③ **Anterior / Posterior OR Transverse**
› Is the **back of the head** towards the back of mom (**posterior**), facing towards the front of mom (**anterior**) OR the side of mom (**transverse**)?



→ **MOST IDEAL POSITION**

THE 4 P'S OF LABOR

① PASSAGEWAY : shape of mother's pelvis → the birth canal



GYNECOID
- Round
- most ideal !!
- THINK: "Gyn" for gynecologist

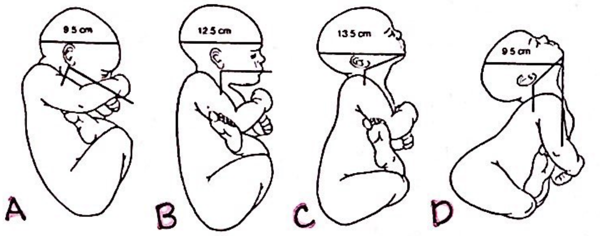
PLATYPELLOID
- FLAT/OVAL
- THINK: a platypus has a flat beak
- C-SECTION

ANDROID
- WEDGE/♡
- Typical male pelvis shape
- not ideal for vaginal delivery

ANTHROPOID
- OVAL LONG
- good for vaginal delivery

MOST FAVORABLE FOR VAGINAL DELIVERY:
1. Gynecoid
2. Anthropoid

② PASSANGER : (5) characteristics



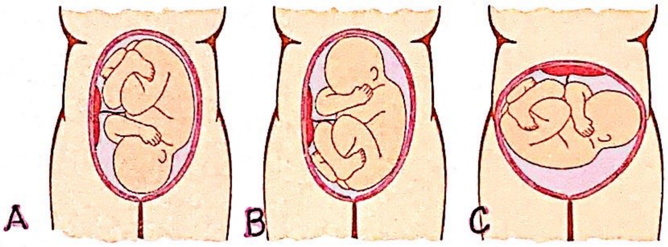
ATTITUDE (head posture)

A: **VERTEX (OCCIPUT)** – The fontanel is the presenting part, most ideal

B: **MILITARY (SINCIPUT)** – fetal head is partially flexed and the anterior fontanel is the presenting part

C: **BROW** – Think the eyebrow is presenting

D: **FACE** – sharp extension



LIE + PRESENTATION

LIE – babys back in relation to mom's back
- A: longitudinal
- B: longitudinal
- C: Transverse

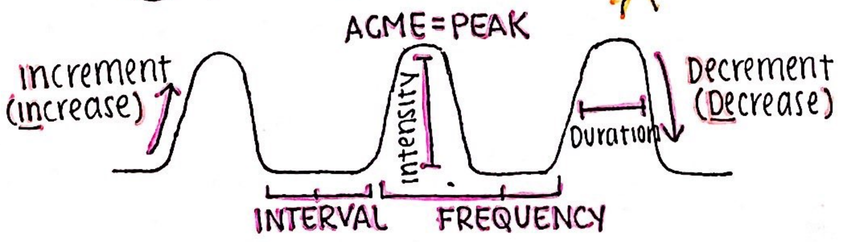
PRESENTATION – which part of the fetus is leading
- A: vertex
- B: Breech
- C: shoulder

STATION:
- The presenting part in relation to the ischial spine (Refer to my study sheet)

POSITION:
1. Is the back of the head towards the left or right?
2. What is the presenting part?
3. Is the back of the head anterior, posterior, or transverse?

EX: LOA → GOOD :)
LOP → :(

③ POWER : contractions



④ PSYCHE

- culture
- preparation
- support system
- previous births
- current pregnancy
- pain/Fear/Anxiety

STAGES OF LABOR

STAGE 1: begins with REGULAR contractions → fully dilated cervix

GOAL: cervical dilation from 0-10cm and 100% effacement

LONGER for 1st Time mothers

① LATENT STAGE (Early Labor)

Longest phase for first time momma's

- cervix dilation: 0-4cm
- contractions: q15-30min lasting 30-45 seconds each — MILD
- Duration: varies for everyone but may last up to 20 hours
  Mom will probably spend most of this at home
- Mother: ALERT, excited, verbalizes concerns, may relax or sleep
- Nursing care: encourage ambulation
  encourage breathing techniques
  Leopolds maneuver to assess fetal presentation

② ACTIVE STAGE

- cervix dilation: 4-7cm
- contractions: q3-5min lasting ~60 seconds each — MODERATE/STRONG
- Duration: ~4-8hours *Time to go to the hospital*
  water may break or already have broken
  - → Nitrazine
    - Blue = GOOD
  - → ASK: COLOR?
    - GOOD: clearish
    - BAD: green/brown = meconium = ↑ RISK of aspiration or sign of fetal distress
- Mother: ALERT, demanding, anxious, restless, may seek pain relief, breathing techniques
- Nursing care: counterpressure to sacral area
  pillow support, back rubs
  talk through contractions
  assist with position changes/bathroom (full bladder may hinder CX)
  initiate hydrotherapy
  offer/explain pain meds
  vital signs - Mom + baby

③ TRANSITION STAGE *shortest stage but most intense*

- cervix dilation: 7-10cm
- contractions: q2-3min lasting ~60-90 seconds each — STRONG
- Duration: ~30min - 2hours
- Mother: Restless, Agitated, concentration, Pressure on Rectum }
- Nursing care: stay with mom!
  Encourage relaxation + breathing
  Teach to pant → avoids premature pushing }
  Vital signs - Mom + baby

PREPARE FOR BIRTH ♡

STAGES OF LABOR

STAGE 2: begins when Mom is fully dilated → delivery of baby

PUSH PHASE

- Baby is descending through the birth canal
- contractions: q2-3min lasting ~60-90 seconds each
- Duration: First time mom → 1-3 hours
  Multiparity → ~30min
- Nursing care: Educate how to push + position (High Fowlers, Lithotomy, squatting, side lying)
  ENCOURAGEMENT
  Monitor VS + Fetal HR
  Record time is delivered

KEY: PERINEUM is bulging
↑ in bloody show
Visible body parts

WATCH FOR: Turtle sign !!!
- When the fetal head retracts like a turtle once it emerges from the vagina
= Shoulder Dystocia

STAGE 3: full delivery of baby → full delivery of placenta

*should be NO LONGER than 30minutes! → ↑ Risk of Hemmorrhage

- signs placenta being delivered: umbilical cord lengthens
  uterus changes from oval to globular
  Trickle or gush of blood
- Nursing care: surrounded by preventing hemorrhage: monitor BP
  monitor bleeding/pads
  ADMINISTER OXYTOCIN AFTER placental delivery → prevents hemorrhage
  assess if placenta is fully intact, Note time of delivery
  Make sure momma is comfy, encourage skin to skin, bonding + early breastfeeding
  peri-care (bleeding + lacerations)
- placenta characteristics:
  - Schultz: the fetal side
    SHINY (like a new baby!)
  - Duncan: mother's side
    DULL, Red, Rough (mom just had a rough labor)

STAGES OF LABOR

STAGE 4: first 4 hours after birth of placenta

- Nursing care: All about caring for mom
  - Monitor HR/BP → ↑ RISK Hemorrhage
  - Monitor Temp → ↑ RISK infection
  - Assess Fundus → ↑ RISK Uterine Atony
  - Monitor Lochia and peri-pad usage
  - Pain Relief
  - Peri-care + c-section care
  - Encourage bonding ♡

FUNDAL ASSESSMENT:

- Immediate postpartum, fundus should be:
  - midline
  - firm
  - at or near the umbilicus
- If the fundus is SOFT, boggy, or displaced:
  - FUNDAL MASSAGE
  - BATHROOM

The fundus will continue to descend 1 cm (1 finger length) per day for the next 2 weeks

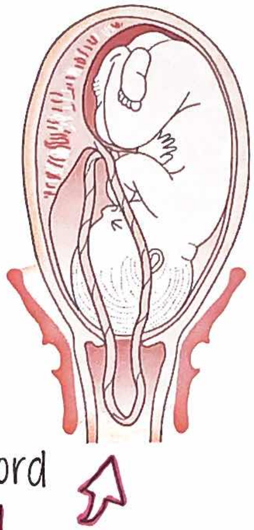
LOCHIA ASSESSMENT:

1. **Lochia Rubra (RED)** – Dark Red or Bright Red
   Duration: 1-3 days after birth
   Characteristics: heavy flow, small/medium clots
2. **Lochia Serosa** – Pinkish, Brown
   Duration: 4-10 days after birth
   Characteristics: Less blood, more discharge, fewer clots
3. **Lochia Alba** – Yellow, White
   Duration: up to 6 weeks
   Characteristics: very little blood, some discharge, no clots

RED FLAGS:

- soaking through a pad in 1 HOUR or less
- passing clots bigger than a GOLF BALL
- bleeding that stops and then starts again
- Fever
- abdominal pain more than usual

LABOR COMPLICATIONS



CORD PROLAPSE: when the umbilical cord **protrudes in front of the baby** → cord is compressed under baby's head

RISK: ↓ **blood flow** to baby → ↓ O_2 **to baby**

Dx: **visible cord** at the vulva
- **cord is felt** on vaginal exam
- variabe + prolonged decelerations are associated

CARE:
1. call for help
2. **Relieve pressure** on the cord → insert 2 fingers into the vagina and lift the baby's head off the cord
   - Mom in **Knee-to-Chest** position OR **Trendelenburg**
   - **DO NOT REMOVE FINGERS**
3. Monitor FHR
4. Delivery of baby (most likely C-section)

DYSTOCIA: **difficult or abnormal labor** due to small birth canal or abnormal fetal presenting part (shoulder)

S/S: **difficulty progressing labor** (dilation, effacement or descent)
- **SHOULDER DYSTOCIA:** **"Turtle's sign"** → The shoulder is stuck behind the pelvic bone and the **head goes in and out of the vagina**

CARE:
- **change positions** → hands + knees or knee to chest
- **oxytocin** (pitocin)
- ambulate
- forceps / vacuum birth
- **suprapubic pressure – shoulder dystocia**

PRETERM BIRTH: AKA Preterm labor **before 37 WKS**

PPROM – Preterm Premature Rupture of Membranes

CAUSE:
- **stress** (Physical or Psychological)
- **infection**
- **Abruption** (in response to bleeding, uterus contracts to clamp blood vessels → induction of labor)
- **Uterine distention** (tricks the body thinking its further along, ex: Twins)

AVOID: vaginal **exams** = ↑ risk **infection**

TX: #1: **Administer** dose of **steroids** to speed up fetal lung maturity + **Tocolytic** to delay delivery **~48hrs** to let steroid take effect
- **Magnesium sulfate** → protect baby from neuro defects
- **Bed Rest**

LABOR COMPLICATIONS CONT.

MECONIUM STAINED AMNIOTIC FLUID:

Meconium: first stool passed by the baby

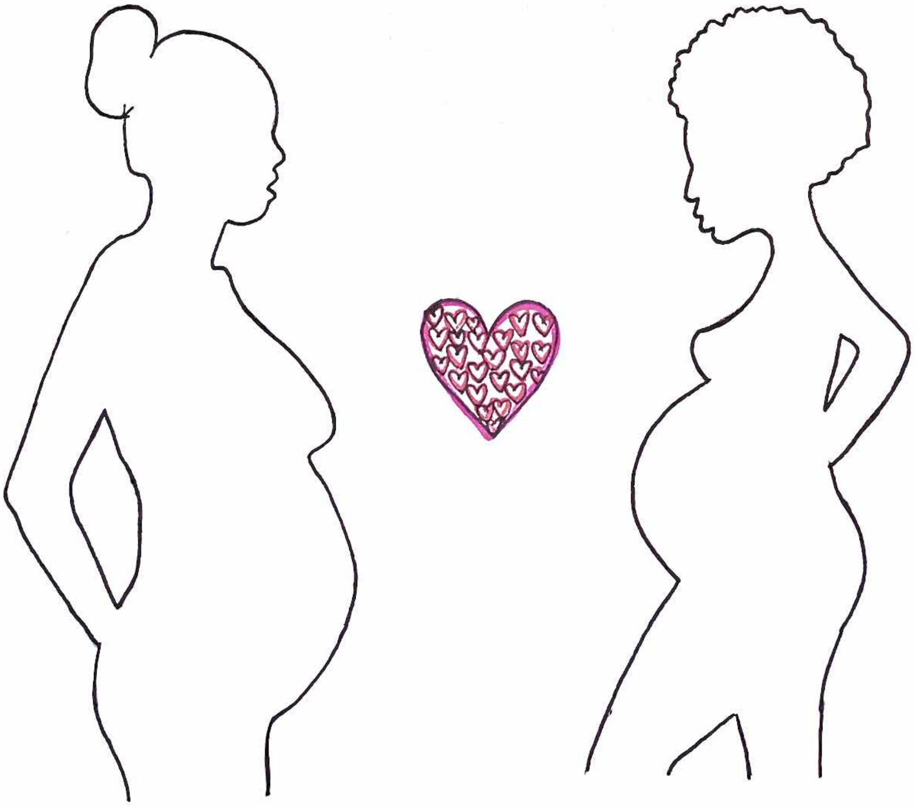
In UTERO: may indicate normal GI maturing
-OR-
hypoxic event → fetal compromise

Dx: Greenish color amniotic fluid
Rapid breathing of baby after birth
BAD: in utero = late or variable decelerations = respiratory distress

CARE: Prepare equiptment for neonatal resuscitation
Monitor baby (RR, color)

PRECIPITOUS LABOR: less than 3 hours

Risk: vaginal tearing
Infection if labor happens in unsterilized environment



POSTPARTUM HEMORRHAGE

WHAT IS IT? a significant loss of blood after giving birth
#1 cause of maternal morbidity and mortality

CRITERIA:
1. >500mL blood loss (vaginal birth) → assess peri pads
   >1000mL blood loss (C-section)
   BAD: soaked in <15min
   <1hour = ALARMING
2. Change in BP, HR, O_2 sat → further assess
   Restless, cool, clammy
3. 10% or more fall in Hct → takes time to be reflected on labs so not an immediate indicator

CAUSES: THINK: 4 T'S

① TONE AKA UTERINE ATONY – lack of uterine tone due to:
- Distension → multiple pregnancies, multiple babies (twins), LGA
- Muscle fatigue → long delivery
- uterine relaxants

TX: Fundal Massage → uterus should NOT be soft, boggy
Uterotonics

② TRAUMA – damage to any part of mom's pelvis, uterus, vagina due to:
- baby coming through birth canal
- medical forceps, vacuum, episiotomy
- C-section incision

ALARMING: hematomas can form and go unnoticed for hours

S/S: persistant bleeding, severe pain
TX: surgical

③ TISSUE – retained placental fragments → prevents CX → Atony!
- Ensure placenta comes out entirely
- Remove fragments immediately → D&C procedure

④ THROMBIN – clotting conditions from mom that prevent normal clotting. Includes: Accreta
DIC

Tx: Give blood!
Fluids
Factor Repletion

FOR ALL CAUSES:
- Notify HCP
- continuous vitals, give O_2
- monitor peri pads
- IV fluid Replacement
  - Blood products
- may need pitocin or catheter

Hemorrhage w/in 24h after delivery: PRIMARY PPH
when its after 24h: SECONDARY PPH

PLACENTA PREVIA

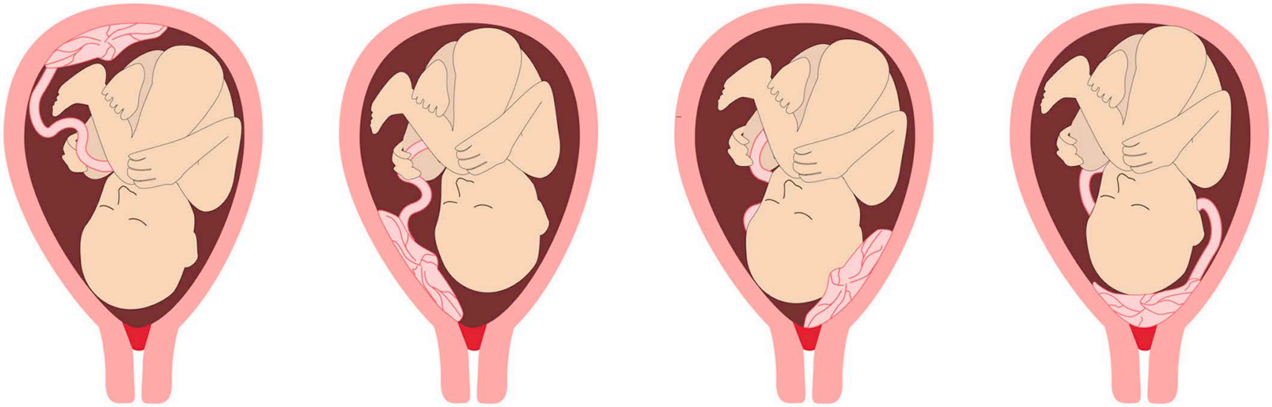
WHAT IS IT? Attachment of the placenta is partially or fully covering the cervical opening

RISK: Placenta may separate from the uterine wall OR rip open as the cervix begins to dilate during labor

RISK FACTORS:
1. Maternal Age >35
2. Multiparity
3. Having multiple children at once
4. smoking / cocaine
5. Previous placenta previa
6. Uterine scarring (previous c-section)

Marginal = vaginal
Partial / Full = C-section
may always change!

KEY: Typically diagnosed in the 2nd trimester (~20WKS). IF partial or marginal, the placenta may correct itself and shift upwards as pregnancy progresses → Recheck at ~30WKS



SIGNS + SYMPTOMS:

- PAINLESS, bright red bleeding
- NONTENDER, relaxed, soft uterus
- Episodes of bleeding (mild to profuse)
  - Placenta is very vascular! cervix starts to thin and may tear
- spontaneous bleeding after sex
- Abnormal Fetal Position → placenta blocks the normal position of baby (may still have normal HR)

INTERVENTIONS:

- NO sex, NO vaginal exams, NO manipulation of the vagina or abdomen
- If No bleeding or light bleed: bed rest, no strenuous activities
- YES bleeding → continuous monitoring
  - monitor pad count, mom + baby VS
  - left side lying
  - TOCOLYTICS → will stop contractions
  - IF still doesnt stop = C-SECTION

PLACENTAL ABRUPTION

WHAT IS IT? Premature detachment of the placenta before childbirth

* May vary in degree of separation → Partial or Total

WHAT'S THE CONCERN?

- Risk of uncontrolled bleeding!
  - → HEMORRHAGE + SHOCK
- Disseminated Intravascular Coagulation
  - → Placenta releases lots of Thromboplastin which causes clotting
- major organ failure
- not enough oxygen to baby / premature birth

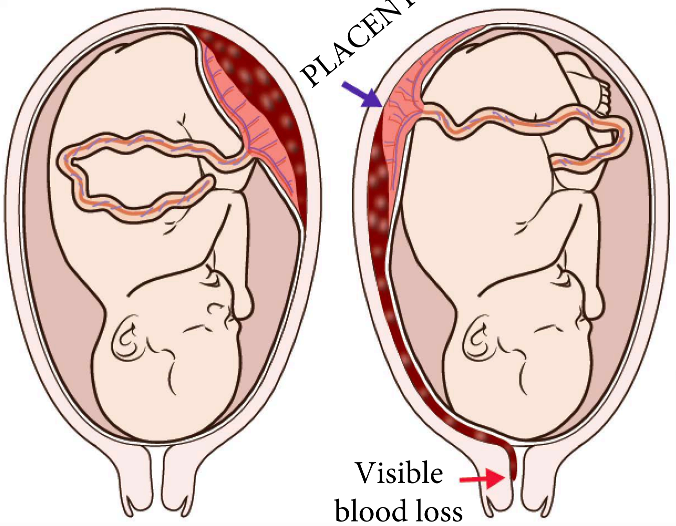
ROLE OF PLACENTA:

A organ that develops during pregnancy to:

- Provide oxygen + nutrients to baby
- Remove waste products from baby
  - via umbilical cord

⇓

lifeline between mom + baby



CAUSES:

- **TRAUMA!** injury to the abdomen
- Previous placental abruption
- **chronic hypertension**
- Preeclampsia
- PROM
- smoking / cocaine
- multiparity
- Having multiple children at once

* You **cant prevent** abruption, but you **can** ↓ **Risk factors** *

SIGNS + SYMPTOMS

- concealed blood loss → DARK vaginal bleeding, Extended fundal height
  - Blood is pooling
- Abdominal PAIN
- uterine contractions dont relax (Tetany)
- HARD abdomen
- Distressed baby → ↓ fetal movements
- Feeling faint, nausea
- May have visible blood loss!!

NURSING CARE:

- **Monitor** for concealed bleeding or visible bleeding
  - Pad count, fundal height
- **NO** abdominal or **vaginal exams** until r/o previa
- **NO supine** → **left** side lying will ↑ **perfusion** to baby
- **Monitor** HR of baby; Mom **VS q15min**
- Type + cross for blood, CBC, clotting levels
  - → 18G IV or larger
- Prepare for delivery
  - → C/S if abruption affect mom or baby

PREECLAMPSIA + SEIZURE CARE

WHAT IS IT? Pregnancy complication involving the development of high blood pressure (after 20WKS)

SIGNS + SYMPTOMS:

- Headache
- blurry vision
- RUQ pain or low abd pain
- ↓ urine output
- swelling of hands + feet
- SOB or ↑ weight

CLASSIC DUO:

1. Hypertension
2. Proteinuria

+ any of these symptoms

RISK FACTORS:

1. Hx of Preeclampsia or FHx
2. First pregnancy
3. Diabetes, Preexisting HTN, Renal Disease
4. obesity >30BMI
5. multiple babies (Twins)
6. Age <18 or >35
7. African American

PATHOPHYSIOLOGY:

UNKNOWN

- may be due to abnormal placental development / attachment or blood vessel constriction

DIAGNOSIS:

- HTN > $\frac{140}{90}$ on 2 separate readings 4-6hr apart
- Proteinuria: >300 in 24hr urine
  - ≥0.3mg/dL protein/creatinine
  - >+1 dipstick
- Pt must be previously normotensive!

NURSING CARE: PREVENT ECLAMPSIA

- monitor HR, BP, Proteinuria, edema, SOB, I&O's
- Daily weights
- Monitor neuro status for impending seizure!!
- Monitor DTR's for impending seizure!!
  - BAD: ↑ DTR (hyperactive) + clonus
- Place pt in left side lying → ↑ perfusion to baby + FHR monitor!
- GIVE MAGNESIUM SULFATE (seizure prevention)
  - Toxicity: flushing, warm, ↓DTR, ↓RR, ↓BP, ↓UOP
  - Antidote: calcium gluconate
- Watch for HELLP syndrome
  - Hemolysis, Elevated Liver Enzymes, Low Platelet Count ⇨ Tx: Deliver baby

IF SEIZURE:

- STAY WITH PT
- do not restrain, nothing in mouth
- O_2, monitor baby
- left side lying
- prepare for delivery

MAGNESIUM SULFATE

WHAT IS IT USED FOR? prevention of siezures in **preeclampsia**, slowing or stopping **preterm labor** or **protect the brain** of premature babies

ACTION: CNS Depressant that decreases the amount of Ach → ↓ Neuromuscular transmission = Decrease excitation and chill the mom out
- Anticonvulsant medication

KEY: main use for preeclampsia (prevent siezures). If used for preterm labor, it can be used for up to TWO days (gives time to help baby's lungs to develop)

SIDE EFFECTS:

MOM
- ↓ **Respirations**, ↓ **BP**
- **Drowsiness**, fatigue
- Nausea, vomiting, dizzy
- blurred vision
- muscle weakness
- **Altered LOC**
- sweating / flushing ← may be a toxic symptom

BABY

CAN CROSS THE PLACENTA
- poor muscle tone
- ↓ **FHR**
- ↓ **RR** = can pass through **breast milk!**

Long term >7days: low calcium in baby's bones!

THERAPEUTIC: 4.8-9.6 mg/dL

★ Typically give at a dose of 4-6g over 20 min and then followed by continuous IV infusion at 2g/hr

TOXICITY:

>9.6mg/dL

Watch for:

EARLY: warmth
- flushing
- slurred speech

MAJOR S/S: "BURP"
- **B**lood Pressure ↓
- **U**rine output ↓ <30mL/hr
- **R**espirations ↓
- **P**atellar DTR Absent

ANTIDOTE: calcium gluconate!!

NURSING CARE:

- monitor mom + baby vital signs
  - mom: RR, HR, BP; baby: FHR; if breastfeeding: RR
- Frequent DTR checks
- Frequent Neuro checks
- Place mom on siezure precautions
- monitor magnesium levels
- monitor urine output
- Check BUN and Cr levels to make sure kidneys are functioning to excrete the drug

Main goal: prevent siezures and watch for toxicity :)

DO NOT GIVE TO:

1. Patients with **Renal Disease**
   - trouble excreting
2. Patients with ♥ **disease**
   - worsen ♥ blocks
3. **Myasthenia Gravis**
   - will worsen sx

MOM TO BABY INFECTIONS

① TORCH infections: numerous diseases that cause congenital conditions if the fetus is exposed to them in the uterus.

T → TOXOPLASMOSIS: parasitic disease

- found in Raw, poorly cooked meat, CAT FECES
- Pregnant woman should NEVER change cat litter boxes!!

S/S IN CHILD: blindness, hydrocephalus, mental retardation

O → OTHER: **SYPHILIS – Bacterial STI**

- S/S IN CHILD: Rash on palms + soles, Hutchinsons teeth saddle nose, frontal bossing
- TX: ABX for mom + baby

VARICELLA: viral

- S/S IN CHILD: limb atrophy, damage to brain + eyes
- TX: VZIG immunization for baby, IV antiviral for mom

HIV: viral STI + bloodborne

- S/S IN CHILD: poor weight gain, repeated infections
- AVOID BreastFeeding!!
- TX: 6 weeks of antiretroviral therapy for baby, ART for mom

R → RUBELLA: viral

- S/S IN CHILD: PDA♡, cataracts, deafness, miscarriage

  MOST Damage in the 1st Trimester
- TX: MMR vaccine – baby + nonpregnant mom (Live vaccine)

C → CYTOMEGALOVIRUS: viral (body fluids)

- S/S IN CHILD: premature birth, low birth weight, hearing loss microcephaly, siezures
- TX: antiretroviral therapy

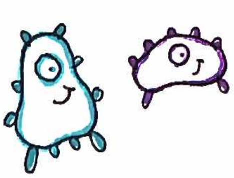
  Hand Hygiene!! Avoid kissing baby on mouth

H → HERPES SIMPLEX: viral STI and saliva

- S/S IN CHILD: skin lesions, CNS herpes (siezures, poor feeding tremors, lethargy)
- TX: antiretroviral therapy

* Transmitted during vaginal delivery *

MOM TO BABY INFECTIONS



② UTI'S + YEAST INFECTIONS : fungal

- UTI may cause **kidney infection** → **early labor / low birth weight**
- **Yeast infection** may **spread** to **baby** via vaginal delivery
  - → may cause **oral thrush** in baby
- **BOTH do not pose any significant threat to baby**

S/S IN MOM: urinary **urgency**, **frequency**, dysuria
urine is **cloudy**, (+) for bacteria / blood

For yeast: thick white discharge, vaginal itching

CARE: **Abx**, **Teach** wipe front to back, ↑ **fluids**

③ GROUP B STREP : bacteria that is frequent in the vagina + rectum

- **Do not** typically cause symptoms
- May pass to baby during **vaginal delivery**
- TESTING: 36 WKS to prepare for birth plan
- TX: **Abx** and **potential c-section**

POSTPARTUM:

① ENDOMETRITIS: inflammation of inner lining of uterus

CAUSES: Retained placental fragments
c-section
internal Fetal Heart Monitor

S/S: pelvic pain, excessive / odorous lochia, ↑ WBC, flu-like sx

CARE: **Abx**, **analgesics**, hand hygeine, vaginal + blood cultures

② MASTITIS: inflammation of breast tissue + potential infection

CAUSES: blocked duct, poor breastfeeding technique

S/S: **painful**, **Red**, **HARD** area on breast, ↑ WBC, flu like sx

CARE: **Abx**, teach to **empty breast** after every feed, **breastfeed frequently!**

③ UTI: CAUSE - catheters, C-section, frequent vaginal exam

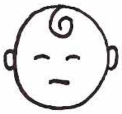
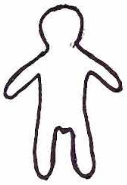
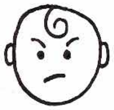
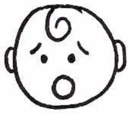
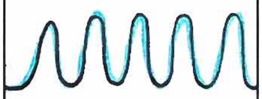
S/S and CARE same as above

APGAR ASSESSMENT

WHAT IS IT? a method to quickly assess the status of a newborn after birth

- Performed at **1 minute** and **5 minutes** after birth
  may be done at **10 minutes** if score is persistantly low
- Acts as a **baseline** for all future observations

SCORING:
0-3 = serious danger + immediate resuscitation
4-6 = some additional help needed (oxygen, suction, stimulation)
7-10 = baby is in good health ♡

SCORE	Appearance	Pulse	Grimace	Activity	Respiration
0	Pale or blue	No pulse	 No response to stimulation	 Floppy; no movement	No breathing
1	Pink body, blue extremities	<100bpm	 Grimace/weak cry when stimulated	Some flexion	Weak, slow breathing
2	Completely pink	>100bpm	 Cry when stimulated	Active; well flexed and resists extension	 Strong cry

WE ALSO WANT TO ASSESS:

- **Jaundice** → BEFORE 24hours = Pathologic (Needs Tx)
  AFTER 24hours = Physiologic (harmless)
- **Cold stress** → metabolic acidosis = baby should wear +1 layer of clothing
- **Reflexes** → startle reflex AKA Moro reflex – startled / responds to sound
  Babinski reflex – stroke sole of foot
  Fencing – looks like a fencing pose
  Root reflex – stroke corner of baby's mouth

LABOR MEDS

UTERINE STIMULANTS

OXYTOCIN aka PITOCIN

USED FOR: induction of labor
enhancement of labor
placental delivery
post partum control of bleeding

{stimulates uterus to CONTRACT}

SIDE EFFECT: painful contractions
Too much = uterine rupture + fetal distress

KEY: MONITOR contractions (GOOD = <60 sec, q2-3min)
MONITOR mom/baby BP + pulse

WATCH for water intoxication in mom
- This is an antidiuretic effect

"Too good contractions" = Mag will counteract

PRE-TERM LABOR

① TERBUTALINE SULFATE

"Turbulence delays arrival time"

USED FOR: delaying labor
COPD/asthma!!

DOES NOT PREVENT LABOR

{activates B_2 = relaxed uterus + bronchodilation}

SIDE EFFECT: Tachycardia, Restless, Angina, Tremors

CONTRAINDICATED: 34wks + -OR- Dilation >6cm

AKA: TOCOLYTICS

PRE-TERM LABOR

② NEFIDIPINE - calcium channel blocker

ACTION: ↓BP, Relax uterine contractions
WATCH: orthostatic hypotension
(not used as much d/t rapid ↓ BP)

③ INDOMETHACIN - NSAID

ACTION: blocks prostaglandin synthesis = suppress labor
given PO or Rectal

{Best for <30WKS}

④ MAGNESIUM SULFATE

USED FOR: Preeclampsia + preterm labor
Relaxes smooth muscle of uterus
CHECK: BUN/Cr levels
WATCH: S/S toxicity = ↓ DTR, ↓ urine out, ↓RR
ANTIDOTE: calcium gluconate

NONPHARMACOLOGICAL

① Effleurage - Take fingers or palm and lightly stroke abd during contraction

② Sacral counterpressure - heel of hand or fist and push on mom's sacrum

③ Breathing techniques

④ Imagery/music ♫ ♩

⑤ Hydrotherapy
shower or bath

OPIOID ANALGESIC + ANESTHETIC

① MEPERIDINE - for moderate to severe pain
↓pain without causing significant ↓ RR in mom and baby → BUT can cross placental barrier

SIDE EFFECT: GI upset, sedation, dry mouth, ↓BP, ↓ Fetal HR

KEY: labor must be well established = >4cm dilated
watch for ↓ Resp Rate, NALOXONE = antidote

② SPINAL EPIDURAL

USED FOR: eliminating sensation from umbilicus to thighs

SIDE EFFECT: maternal hypotension
fetal bradycardia

KEY: must be at least 4cm dilated

③ SPINAL BLOCK - C-SECTION

USED FOR: eliminating sensation from nipples to feet

SIDE EFFECT: maternal hypotension
fetal bradycardia
Headache = leaking CSF
maternal bladder/uterine atony

KEY

- Administer IV fluids to counteract hypo
- place mom on SIDE to reduce hypo
- continuous VS on mom and baby

Common Maternal Terminology A-Z

A

Abortion – spontaneous or intentional termination of pregnancy
Accelerations – a temporary increase of the fetal heart rate above baseline
Acme – peak of uterine contraction
Acrocyanosis – bluish discoloration of the extremities due to reduced peripheral circulation
Amenorrhea – absence of menstrual period
Amniocentesis – procedure that removes amniotic fluid from the amniotic sac for testing (chromosome abnormalities, neural tube defects, genetic disorders, etc.) or treatment
Amnioinfusion – infusion of saline into the amniotic cavity to relieve umbilical cord compression
Amnion – inner membrane (fluid-filled sac) surrounding the fetus
AROM – artificial rupture of membranes → intentional rupture of the amniotic sac
Atony – lack of muscle strength or tone
Attitude – head posture of the fetus

B

Bloody show – presence of tinged pink/brown mucous that indicates labor is approaching
Breech – bottom fetal presentation

C

Cephalic – head-first position of the baby for birth (crown of the head)
Cephalopelvic disproportion – the fetus is too large and cannot pass through the maternal pelvis
Cervical dilation – opening of the cervix from 0-10cm
Chorioamnionitis – inflammation of the chorion and amnion due to bacterial infection
Chorion – outer membrane surrounding the fetus
Colostrum – first form of milk produced by the breasts immediately following delivery
c/s – cesarean section
Crowning – baby's head becomes visible in the birth canal
cx – contractions

D

Decelerations – periodic decrease in fetal heart rate (early, late, or variable)
Decrement – **DE**creasing of contraction
Diastasis recti – partial or complete separation of the abdominal muscles
D&C – dilation and curettage → dilation of the cervix and removal of part of the lining of the uterus by scraping or scooping the tissue
d/c – discontinue
Dystocia – difficult labor due to abnormal fetal size or position

E

Eclampsia – complication of preeclampsia; pregnancy induced hypertension resulting in seizures
EDD – estimated date of delivery
Effacement – thinning of the cervix from 0-100%

Effleurage – soothing, stroking, circular movement along the abdomen with the fingertips
Engagement – the longest diameter of the fetal presenting part passing through the pelvic inlet

F

Fetal bradycardia – when the fetal heart rate drops below 110bpm for 10 minutes or longer
Fetal tachycardia – when the fetal heart rate rises above 160bpm for 10 minutes or longer
Fontanelle – anatomical landmark on the infant skull comprised of soft membranous gaps between the cranial bones (anterior and posterior fontanelles)
FHR – fetal heart rate
Fundus – top of the uterus

G

GBS – Group B Streptococcus
GDM - gestational diabetes mellitus
GTPAL – gravidity, term births, preterm births, abortion, living children
Gravidity – number of times a woman has been pregnant

I

Increment – **IN**creasing contraction intensity
Involution – shrinking of the uterus to its original size
Ischial spine – the point of reference to tell when the baby is engaged with the mother's pelvis
IUGR – intrauterine growth restriction

L

Lamaze breathing – a form of deep breathing during contractions as a form of pain management. Goal: mother responds to contractions with relaxation rather than tension
Lanugo – thin, soft hair that sometimes covers the body of newborns
Leopold's Maneuver – abdominal palpation used to determine fetal position within the uterus
LGA – large for gestational age
Lie – position of the baby's spine in relation to the mother's spine
LMP – last menstrual period
LOA – left occiput anterior (optimal)
LOP – left occiput posterior
Lochia – vaginal discharge (mixture of blood, mucous and uterine tissue) after giving birth

M

Macrosomia – newborn that is large for gestational age (>8lb 13oz)
Mastitis – inflammation of breast tissue
Meconium – infant's first bowel movement
Multi – multiple

N

Naegle's Rule – calculation used for estimating the expected due date based on a woman's last menstrual period
Nitrazine test – pH strip testing used to determine the presence of amniotic fluid in vaginal secretions (will turn blue is >6.0pH → ruptured membranes)
Nuchal cord – umbilical cord is wrapped around the baby's neck

Nulli – none

O

Occiput – back of the fetal head
Oligohydramnios – a lack of amniotic fluid
Oxytocin – hormone that can cause or strengthen labor contractions

P

Passageway – shape of the mother's pelvis
Passenger – the fetus
Parity – number of times mom has given birth to a baby
Pitocin – synthetic form of oxytocin
Placenta – organ that provides oxygen and nutrients to the baby and removes waste products from the baby's blood
Placental abruption – premature detachment (partial or total) of the placenta before childbirth
Placental previa – attachment of the placenta is partially or fully covering the cervical opening
Polyhydramnios – an excess of amniotic fluid
Power – strength of contractions
PPH – postpartum hemorrhage → severe bleeding or blood loss after giving birth (vaginal: >500mL; c-section: >1000mL)
Preeclampsia – gestational hypertension with presence of proteinuria
Primi – first
PROM – premature rupture of membranes (before labor begins)
PPROM – preterm premature rupture of membranes (before 37 weeks)

Q

Quickening – when the mother starts to feel or perceive fetal movements

R

ROA – right occiput anterior (optimal)
ROP – right occiput posterior

S

SGA – small for gestational age
Shoulder dystocia – the fetal head is born but the shoulder gets stuck above the symphysis pubis
SROM – spontaneous rupture of membranes (during labor)
Station – a measurement of where the fetal presenting part is located in relation to the ischial spine

T

Teratogen – an agent that causes malformation (physical or functional defects) of the embryo or fetus. Ex: medications, radiation, illicit drugs, maternal infections
Tocolytics – medications that inhibit uterine contractions

U

Uteroplacental insufficiency – placenta is not delivering enough oxygen to the fetus

V

Variability – fetal heart rate varies in duration, intensity and timing
VBAC – vaginal birth after having a cesarean birth
Vertex – head-first position of the baby for birth (crown of the head)

Postpartum Physical Assessment: BUBBLEHE

B	**Breast (Breast, Cardiac, Respirations)**
	○ Expose only one breast at a time. Begin using circular motion with the flat surface of your fingers
	○ Palpate the consistency: soft, filling, tense, or engorged
	○ Inspect nipples: observe if erect, inverted, fissures, cracks, or soreness
	○ Ask the breast-feeding mother to pinch the nipples to note if there is any colostrum
U	**Abdomen (Uterus, Bladder)**
	○ Palpate for diastasis recti (abdominal separation)
	○ Explain to client diastasis recti and nursing interventions for this condition as indicated
	○ Observe for linea nigra and striae gravidarum
	○ Observe condition of abdomen (if c-section) state condition of the incision-approximation, apply **THINK** – REEDA: redness, edema, ecchymosis, drainage, and approximation)
B	○ Palpate bladder and note if it is palpable/not palpable
	○ Palpate the uterus by placing one hand above the symphysis pubis and locating the fundus with the opposite hand
	○ Palpate, note consistency, location, size and height of the fundus in relation to the umbilicus, e.g. 2 FB ↑ or ↓ umbilicus
	○ Note any maladaptive finds and demonstrate appropriate interventions: boggy uterus, misplaced uterus, enlarged uterus
	○ Explain actions to promote involution to client
B	**Bowel (Elimination)**
	○ Explain diuresis and diaphoresis to client
	○ Discuss when to expect the 1st bowel movement and 3 measures to prevent constipation
L	**Lochia (Perineum, Episiotomy/Laceration, Lochia)**
	○ Inspect lochia. State the color, amount, odor, and presence of clots, e.g. scant, rubra, no clots
	○ Explain regression of lochia and when the client may resume coitus
	○ Teach behaviors indicating infection/hemorrhage that the client should immediately report to her doctor
E	○ Inspect episiotomy/laceration for REEDA = Redness, Ecchymosis, Erythema, Dehiscence, and approximation
	○ Teach comfort measures for an episiotomy and/or hemorrhoid
H	**Lower Extremities (legs, pulses)**
	○ Inspect and palpate legs for edema, redness, tenderness, and increased skin temperature
E	**Emotions**
	○ Discuss what to expect with emotional status. Explain "baby blues" and postpartum depression
	○ Observe for bonding

KEY CONSIDERATIONS:

- The BUBBLEHE does not have to be executed sequentially.
- If the mother is breastfeeding, do not interrupt breastfeeding instead let her know you will return after she has finished.
- If you need to provide peri care, then begin your BUBBLEHE with this area.

ANSWER SHEET

NAEGLE’S RULE:

1. July 11th, 2021
2. March 23rd, 2021
3. January 27th, 2021
4. October 20th, 2020
5. August 8th, 2021

GRAVIDITY/PARITY/GTPAL:

1. Nulligravida → HINT: Nulli – none; Gravidity – being pregnant
2. Nullipara → HINT: Nulli – none; Parity – never given birth >20 weeks
3. Multigravida – a woman who has been pregnant more than once → HINT: Multi – multiple; Gravida – being pregnant
4. Gravida 1, Para 1; or G1P1

Rationale: The number of babies does not matter; we are only counting pregnancies! So, twins count as one pregnancy. This is her first pregnancy, which would make her a “gravida 1.” She gave birth at 39 weeks so her parity would be 1 as well (>20 weeks).

5. Gravida 7, Para 3; or G7P3

Rationale: The client states that she has been pregnant 6 times and is *currently* pregnant. Gravidity only cares about how many times a woman is pregnant, *regardless* of status of the baby. So, the client’s gravidity is 7. Parity includes *all* births >20 weeks, *regardless* of the status of the baby. She gave birth to 3 children >20 weeks, so her parity would be 3.

6. G2P0; G2 T0 P0 A1 L0

Rationale:
Gravidity: The client is pregnant for the 2nd time Term
Births: The client has not given birth >37 weeks
Preterm Births: The client has not given birth between 20-37 weeks
Abortion: The client has a history of 1 terminated birth at 9 weeks
Living: The client does not have any living children

7. G3P2; G3 T2 P0 A0 L2

Rationale:
Gravidity: The client is pregnant for the 3rd time → currently 6 weeks pregnant and has a history of 2 previous pregnancies
Term Births: The client gave birth on *two* separate occasions at 41 weeks
Preterm Births: The client has not given birth between 20-37 weeks
Abortion: The client does not have a history of abortion of miscarriage
Living: The client has two living children from her “term” births

8. G4P2; G4 T1 P1 A1 L3

Rationale:
Gravidity: The client is pregnant for the 4th time
Term Births: The client states she has had one “term” birth

Preterm Births: The client states she has given birth to *two* twins at preterm. NOTE: Twins count as ONE pregnancy.
Abortion: The client has a history of 1 miscarriage at 16 weeks. HINT: This counts as an "abortion/miscarriage" because it happened before 20 weeks.
Living: The client has 3 living children → one full-term baby and two twins

9. G3P2; G3 T2 P0 A0 L3

Rationale:
Gravidity: The client is pregnant for the 3rd time → currently 16 weeks pregnant and has a history of 2 previous pregnancies
Term Births: All of the client's previous deliveries have been >37 weeks
Preterm Births: The client has not given birth between 20-37 weeks
Abortion: The client has no history of miscarriage or abortion
Living: The client has 3 living children → one 5-year-old and two 2-year-olds

10. G4P2; G4 T1 P1 A1 L3

Rationale:
Gravidity: The client is pregnant for the 4th time
Term Births: The client's second pregnancy ended in a cesarean section of twin boys at 38 weeks. NOTE: Twins count as ONE pregnancy.
Preterm Births: The client gave birth to her daughter at 34 weeks Abortion:
The client has a history of spontaneous abortion at 8 weeks. Living: The client has 3 living children → one daughter and two twin boys

PEDIATRIC BUNDLE

DEVELOPMENTAL MILESTONES
1 – 12 MONTHS

Age	Gross Motor	Fine Motor	Language	Social/Cognitive
1 month	• Attempts to hold head up when prone	• Maintains fisted hands	• Cries when upset/hungry	• Gazes on parent's face when parent speaks
2-3 months	• **Begins to hold head up** • Makes smoother movements with extremities	• Holds object when placed in hand	• **Makes cooing and gurgling sound** • Turns head toward sounds	• Begins to smile at people as a response mechanism
4-5 months	• Hold head steady and unsupported • **Rolls from stomach to back** • **Sits with support**	• Hold objects with **palmar grasp** • Brings hands to mouth • Can swing at dangling toys	• Laughs • **Begins to babble and copies sounds heard** • Distinction between cries for different needs	• Cries when playing stops • Copies smiling expression • Calmed by parent's voice
6-9 months	• **Rolls in both directions (stomach to back, vice versa)** • **Sits without assistance** • Begins to **crawl** • Will bounce when standing • **BIRTH WEIGHT DOUBLED**	• **Moves objects from one hand to the other**	• Takes turns with parent while making sounds • Responds to own name • Strings together vowels • Begins to say consonants	• Knows who is familiar and who is a stranger **(stranger anxiety)** • Responds to the emotions of others
10-12 months	• Pulls to stand • Walk with assistance	• Begins to use **2 finger grasp** to pick things up (pincer grasp)	• **Understands "no"** • Makes a lot of different sounds • Copies gestures of others	• Plays peek-a-boo • Watches the path of something as it falls

DEVELOPMENTAL MILESTONES
1 – 4 YEARS

Age	Gross Motor	Fine Motor	Language	Social/Cognitive
12 months	• Walks holding furniture • May walk first steps **alone** • **Crawls** upstairs • Cooperate with dressing by offering arm or leg • **BIRTH WEIGHT TRIPLED**	• **2 finger pincer grasp** • **Hits 2 objects together** • Copies gestures • Put/take out things from a container • **Pokes with index finger** (Think: pokes is with ONE finger)	• **MAMA/DADA** • Says 3-5 words • Waves goodbye • Shakes head "no" • Tries to mimic words being said	• May have **separation anxiety** • Shy with others • Shows fear • Search for **hidden objects** • Follows simple directions • "Peek-a-boo!"
18 months	• Always walks alone • Walks up and downstairs with help • Throws a ball **overhand** • Jumps in place • Will help undress self	• Builds tower with **3-4 blocks** • Turns **2-3 pages** at a time • **Scribbles** • Drinks from a cup • Eats with a spoon	• **Says 10+ words** • Identifies common objects • Points to show what he/she wants • Follows **1 step verbal commands** – "sit down"	• Temper tantrums • **Ownership "MINE!"** • Imitates others • Plays pretend • **Explores alone with parents close by**
2 years	• Walks up and downstairs **alone** – 1 step at a time • Run without falling • **Kicks ball**	• Builds tower with **6-7 blocks** • **Turns 1 page at a time** • Draws **line**	• Vocabulary – **300+ words** • Can form **2-3 word phrases** (Think: 2 words = 2 years old) • States own name • Points to things or pictures that are named	• PARALLEL PLAY • Begins to gain independence from parents • Gets excited with other children around
3 years	• Walks upstairs **alternating feet** • Pedals a **tricycle** (Think: Tri for 3 years) • Jumps forward	• Draws a **circle** • Feeds self without assistance • Grips marker with fingers instead of fist	• Can form **3-4 word sentences** (Think: 3 words = 3 years old) • Asks "why" • States age • Follows **2-3 steps instructions** (Think: 3 steps for 3 years old)	• Begins ASSOCIATIVE PLAY • Toilet trained except for wiping (Think: 3 for pee-pee) • Has imaginary friends
4 years	• **Hops on one foot** (Think: of your feet in a flamingo shape looks like a 4) • Climbs and jumps • Catches a ball **50%** of the time	• Draws a **square** (Think: a square has 4 sides) • Pours liquid • Cuts with supervision • Mashes own food	• Sings a song from memory • Tells stories • States first and last name • Correctly uses "he" and "she"	• Plays mom and dad • **Would rather play with other children than alone** • Begins creative/make believe play

NCLEX IMMUNIZATION SCHEDULE

A simplified schedule of the most important immunizations for exams

IMMUNIZATION	AGE
Hepatitis B (HepB)	Birth, 1-2 months, 6-18 months
Inactivated Polio Virus (IPV)	2 months, 4 months, 6-18 months, 4-6 years
DTaP (<7 years old)	2 months, 4 months, 6 months, 15-18 months, 4-6 years
Pneumococcal Conjugate Vaccine (PVC)	2 months, 4 months, 6 months, 12-15 months
***Haemophilus influenzae* type b (Hib)**	2 months, 4 months, 6 months, 12-15 months
Influenza	6 months, yearly routine
MMR (Measles, Mumps, Rubella)	12-18 months, 4-6 years
Varicella	12-15 months, 4-6 years
Hepatitis A (HepA)	12-24 months, 6 months after first dose
Meningococcal B	Recommended at 16 years

Minimum age for **Hepatitis B vaccine**	Birth
Minimum age for **DTaP vaccine**	6 weeks
Minimum age for **IPV**	6 weeks
Minimum age for **Hib**	6 weeks
Minimum age for **PCV**	6 weeks
Minimum age for **influenza vaccine**	6 months
Minimum age for **MMR**	12 months
Minimum age for **varicella**	12 months
Minimum age for **Hepatitis A vaccine**	12 months
Minimum age for **Human Papillomavirus (HPV) vaccine**	9 years
Minimum age for **Tdap >7 years old**	11-12 years for routine vaccine 7 years for catch-up vaccine

PEDIATRIC VITAL SIGNS CHEAT SHEET

HEART RATE

AGE	HEART RATE
Neonate (1-28 days)	110 – 180 bpm
Infant (1-12 months)	110 – 160 bpm
Toddler (1-3)	80 – 110 bpm
Preschool Child (3-6)	70 – 110 bpm
School-age Child (6-12)	65 – 105 bpm
Adolescent (12-18)	60 – 100 bpm

RESPIRATORY RATE

AGE	RESPIRATORY RATE
Neonate (1-28 days)	30 – 60 breaths/min
Infant (1-12 months)	30 – 60 breaths/min
Toddler (1-3)	24 – 40 breaths/min
Preschool Child (3-6)	22 – 34 breaths/min
School-age Child (6-12)	18 – 30 breaths/min
Adolescent (12-18)	12 – 18 breaths/min

BLOOD PRESSURE

AGE	SYSTOLIC	DIASTOLIC	SYSTOLIC HYPOTENSION
Neonate (1-28 days)	60-90	20-60	<60 (0 – 28 days old)
Infant (1-12 months)	70 – 105	35 – 55	<70 (1mo – 12mo)
Toddler (1-3)	85 – 105	40 – 65	<70 + (age in years x 2)
Preschool Child (3-6)	90 – 110	45 – 70	<70 + (age in years x 2)
School-age Child (6-12)	97 – 120	55 – 70	<70 + (age in years x 2)
Adolescent (12-18)	110 – 130	65 – 80	<90

TEMPERATURE

AGE	TEMPERATURE
Infants – children <5 years old (the younger the child, the higher the baseline temperature)	**Rectum:** 97.9°F (36.6°C) – 100.4°F (38°C) **Oral:** 95.9°F (35.5°C) – 99.5°F (37.5°C) **Axillary:** 97.8°F (36.5°C) – 99.5°F (37.5°C) **Ear:** 96.4°F (36.7°C) – 100.4°F (38°C)
Children >5 years old	98.6°F (37°C)

OXYGEN SATURATION

GOAL ALWAYS: >95% SpO_2

*Ranges will vary in each nursing program

BACTERIAL MENINGITIS

WHAT IS IT? Acute inflammation of the meninges and CSF via direct invasion OR through the bloodstream

- Meninges → inflamed
- Bacteria → infects the CSF

PATHOPHYSIOLOGY:

ROUTE: ① vascular spread from infection elsewhere

Ex: bacteria enters the nose → travels to nasopharynx → invades underlying blood vessels → crosses the BBB + multiply in CSF

② **DIRECT ROUTE:** penetrating wound, skull fractures, surgery, foreign body (cardiac device)

WITH EITHER ROUTE: Brain becomes swollen and surface of brain becomes covered by a layer of purulent exudate

↓

Pus, fibrin, adhesions may occlude passages and obstruct flow of CSF

↓

clinical manifestations occur

CLINICAL MANIFESTATIONS:

- onset may be abrupt/rapid OR develop over a few days
- NUCHAL RIGIDITY → cant flex neck or go chin to chest
- FEVER
- Headache, vomiting, lethargy, chills
- ↑ sensitivity to light
- (+) Kernigs sign → thigh is flexed 90° at the hip and knee and extension of the knee is painful
- (+) Brudinski's sign → passive forward flexion of the neck cause involuntary raise in knees / flex in hips

MAY DEVELOP:

- seizures
- confusion, drowsy
- hallucinations

NURSING CARE: IMMEDIATE THERAPY

- Broad spectrum Abx until specific organism identified
- Hydration and ventilation → GOAL: Normalize Na+ & ICP levels
- Reduce ICP if needed and continuous ICP measurement
- seizure precautions + antiepileptic meds
- isolation precautions (Droplet)
- Low environmental stimuli
- Thermoregulation, V.S, neuro checks
- COMMON: HEARING LOSS → auditory eval q6mo

DX: LUMBAR PUNCTURE

- CSF will show ↓SUGAR, ↑WBC, ↑PROTEIN

VACCINES:

- vaccinated at 11 or 12yo
- Booster at 16yo

Ex: Meningococcal conjugate

OR

- Hib vaccine at 2, 4, 6mo

VIRAL MENINGITIS

AKA: ASEPTIC MENINGITIS

WHAT IS IT? inflammation of the meninges (membrane covering the brain + spinal cord) **WITHOUT** bacterial growth on CSF cultures

ONSET:
may be abrupt/rapid **OR** develop over a few days

WILL have SIMILAR features as bacterial meningitis:

- NUCHAL RIGIDITY (stiff neck)
- Fever, vomiting
- Headache, irritability
- Photophobia

CAUSE:

- Herpes simplex virus
- Cytomegalovirus
- HIV
- Adenovirus, Enterovirus

DIAGNOSIS:

- clinical manifestations
- CSF findings → **REMEMBER**: there should be **NO** bacteria present

CSF FINDINGS:

WBC: Bacterial: elevated with ↑ neutrophils
Viral: slightly elevated with ↑ lymph

Protein: Bacterial: Elevated
Viral: Normal

Glucose: Bacterial: Decreased
Viral: Normal

Bacteria culture: Bacterial: Positive
Viral: Negative

color: Bacterial: cloudy
Viral: clear

TREATMENT:

MOSTLY SUPPORTIVE CARE

- Acetaminophen for headache and muscle pain
- Hydration
- Positioning for comfort

WE MAY INITIATE PRECAUTIONS:

- Isolation (Droplet)
- Antimicrobials just in case labs have not came back yet

KEY: Bacterial Meningitis is **WAY MORE severe** and can cause serious complications

CEREBRAL PALSY

WHAT IS IT? A disorder that affects **motor function, muscle control, coordination and posture**

CAUSED BY: **Damage** to the developing **brain**
- cases of CP vary in severity

MOTOR TYPES:

① **SPASTIC** - persistant primitive reflexes *** Most common**
- positive Babinski Reflex
- Ankle clonus
- Muscles stiff + tight

② **DYSKINETIC:** involuntary movements
- Dystonia → slow twisting of trunk or extemities
- involuntary jerky movements (slow, worm-like movements)
- Drooling

③ **ATAXIC:** wide based gait
- rapid repetitive movements
- shakey

RISK FACTORS:

- **Infections during pregnancy**
  - CMV
  - Rubella
  - Herpes
  - Syphillis
  - Toxoplasmosis
- **Illness as an infant**
  - bacterial meningitis
  - viral encephalitis
  - untreated jaundice
  - stroke in womb causing brain bleed

SIGNS + SYMPTOMS: WILL VARY GREATLY

- Floppy or stiff muscle tone
- Persistant Moro/Tonic Reflexes
- Poor head control
- Rigid muscles/abnormal posture
- Favoring a particular side of the body
- poor feeding/speaking, Drooling
- Trouble meeting developmental milestones
- seizures

TREATMENT:

- correct defects as **early as possible** to enable affected children to realize their potential within their limits
- **Ankle-foot orthoses** → ankle braces to prevent deformity
- **Medication** → Benzo's to ↓ muscle rigidity
  Antiepileptics
  Botulinum Toxin A → reduce spasms
- speech therapy, PT/OT
- Frequent rest periods, safety-Risk falls

SPINA BIFIDA

WHAT IS IT? Birth defect that occurs when the **spine and spinal cord** form **incorrectly** → leaves the meninges and spinal cord **exposed**

KEY: **THIS IS A NEURAL TUBE DEFECT**

⇓

Neural Tube defects develop during fetal development. The neural tube is responsible for **forming the brain and spine**.

3 TYPES:

① **SPINA BIFIDA OCCULTA** – Defect that is not visible externally

- Lumbosacral Region
- **Most common** + least severe
- **UNKNOWN** to patient! → unless seen during imaging

⇓

Because of this, we only see a **dimple / tuft of hair** over the defect region

- May see a **port wine angioma** (Red birthmark)

TIP: avoid rectal temps → bowel sphincter can cause rectal prolapse

② **MENINGOCELE** – **Hernial protusion** of a sac-like cyst filled with **meninges** and **spinal fluid** that lays on the OUTSIDE of the spinal cord

③ **MYELOMENINGOCELE** – **Hernial Protrusion** of a sac-like cyst filled with meninges, spinal fluid AND spinal cord nerves that lays OUTSIDE of the spinal cord

⇓

S/S of ② AND ③: visible sac like cyst in the lumbar region

- sensory dysfunction → think of your senses
- incontinence of urine + feces
- limb movement dysfunction below the cyst

SEVERE: walking complications, weakness, abnormal growth, scoliosis, hydrocephalus, meningitis

TREATMENT:

① **SB** → often unknown to the patient and doesnt cause any s/s → **No treatment**

② **Meningocele**
③ **Myelomeningocele**
→ surgery (closure of the sac)
* **w/in 24-72 hours**

- Prevent infection!
- Risk of Trauma
- Management of GU sx
- PT/OT

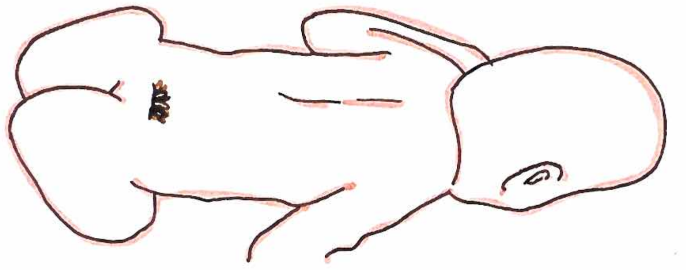
RISK FACTORS:

- ↓ Folic Acid intake
- ↓ exposure to proper nutrients (Malnutrition)
- Drugs / Alcohol
- Exposure to Radiation

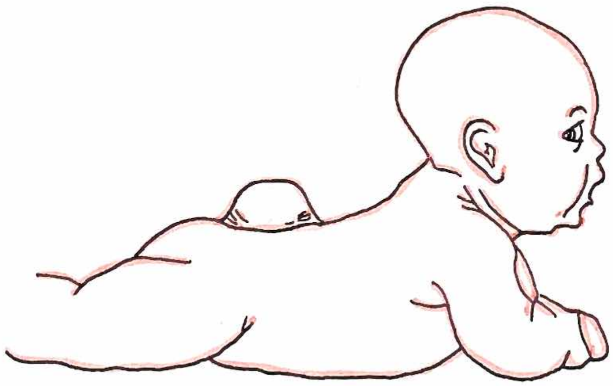
IN PREGNANCY

SPINA BIFIDA VISUALS:

SPINA BIFIDA OCCULTA:



MENINGOCELE AND MYELOMENINGOCELE



NEONATAL SEPSIS

WHAT IS IT? A blood infection that occurs in newborns ≤28 days old

- Neonates have increased susceptibility to infection due to diminished inflammatory and humoral immunity
  - causes decreased or NO inflammatory response to SIGNAL INFECTION

EARLY ONSET: <3 days after birth typically from organisms acquired during labor from mama

- MOST COMMON: GBS in labor → GET GBS TESTING!!!
- OTHER: E. coli, Listeria
- RISK FOR: neuro and respiratory problems if untreated

LATE ONSET: >4 days after birth

- MOST COMMON: staphylococci (CONS)
- OTHER: E. coli, candida
  - FROM: umbilical stump, mucous membranes, skin
- RISK FOR: neuro and respiratory problems if untreated

CAUSES:

- Prenatally → from maternal bloodstream to placenta (CMV, toxoplasmosis)
- Labor → pass from mom to baby in birth canal
- Postnatally → invasive devises, cross contamination with other babies or people
- Prolonged ROM, PRETERM, TRAUMATIC/DIFFICULT LABOR

SIGNS + SYMPTOMS:

- Body temperature changes
- Irregular respirations
- Reduced sucking, grunting, retractions
- Lethargy, irritability
- Abdominal distention, vomiting
- Jaundice, pallor, cyanosis

DIAGNOSTICS:

- Early recognition of S/S
- Definitive Dx: blood culture, urine culture, CSF

May show signs of anemia, leukocytosis, leukopenia

PREVENTION + CARE:

KEY: GBS TESTING at 36 WKS
- IF (+): Abx and potential c-section
- Hep B + HIV screening (passed through breastmilk)
- Early Recognition!

FOR BABY:

- Abx therapy BEFORE lab results are confirmed + organism identified
  - IF (+) - continue 7-10 days
  - IF (-) - discontinue 48-72hrs
- Respiratory support
- VS monitoring, fluid regulation
- Thermoregulation
- Potential blood transfusion for anemia

WATCH FOR: S/S of septic shock OR meningitis

PHENYLKETONURIA (PKU)

WHAT IS IT? A **Rare** genetic disorder where babies **lack the enzyme** needed to **breakdown phenylalanine** into **tyrosine**

⇓

Buildup of phenylalanine in the blood can cause **neuro + cognitive impairments**

› The body excretes abnormal amounts of **Phenylacetic acid**

⇓

Clinical manifestations occure

SIGNS + SYMPTOMS:

- Failure to thrive
- Frequent vomiting, irritability, convulsions
- Hyperactivity, **erractic behavior** problems
- **Older children:** bizarre, schizoid behavior
  - ↳ ↑ phenylalanine, ↓ Dopamine, ↓ serotonin
- **Musty odor** → ↑ phenylacetic acid in urine
- **lighter skin** → ↓ Tyrosine (makes melanin)
  - ↳ Phenylalanine cant break into Tyrosine
- Heart defects
- seizures

DIAGNOSTICS:

- Newborn blood test on baby **(PKU test)**
- screen mom before pregnancy

KEY: Tested after **24 hours old** and after baby has **ingested protein**

TREATMENT:

① **DIET - limited intake of protein!** (protein cotains phenylalanine)

- **PKU formula** → gives you protein without phenylalanine
- **GOAL** - only consume the amount of phenylalanine that you are lacking → **NO MORE!!**

- **WATCH protein** (milk, eggs, cheeze, meat, poultry, fish)
- Frequent blood tests, especially in childhood and growth spurts

In pregnancy: Mom's with PKU must follow a PKU diet before, during, pregnancy

RISK: microcephaly, cognitive impairment, heart defects
Mother could suffer miscarriage

FEVER MANAGEMENT

FEBRILE SEIZURE: Typically occurs in children 6mo-5yo

Trigger = fever — Large groups of neurons activate at the same time

WHY DOES THIS HAPPEN? CAUSE IS UNKNOWN, BUT MAY BE:

1. Fever increases core temperature → makes neurons more excited
2. Fever causes hyperventilation → breathe faster → ↓CO_2 levels in the blood → Respiratory alkalosis → ↑blood pH → Neurons get excited
3. Fever is caused by cytokines that get released by WBC during antibodies immune response

RISK FACTORS:

- 6mo-5yo, MAJORITY: 12-18mo
- Rapidly developed fever
- HIGH fever number
- Certain vaccines that stimulate the immune system (MMR)
  - However, benefits to giving vaccines will outweigh this risk
- FHx of febrile seizures
- The younger the age at onset, the ↑risk of reoccuring episodes

CHILD MAY:

- Flutter eyelids or roll the eyes
- Stiffen, jerk or twitch muscles
- Clench jaw, lose bladder function
- Lose consciousness → POST ICTAL STATE

SIGNS + SYMPTOMS:

FEVER >38°C or >100.4°F

SIMPLE FEBRILE SEIZURE:
- Fever >38°C or >100.4°F
- Has ONE seizure in 24 hour span
- Affects the ENTIRE body
- Last less than 15min

COMPLEX FEBRILE SEIZURE:
- Fever >38°C or 100.4°F
- More than one seizure in 24-hour span
- Affects one part or one side of the body
- Lasts LONGER than 15min

NO ASPIRIN

TREATMENT:

SEEK MEDICAL ATTENTION IF:
- last >5min
- Repeated seizures
- seizures with vomiting, breathing issues, stiff neck

IF NOT SEVERE: Febrile seizure should subside on its own (does not cause long term harm)
- lay child on side during seizure
- Antipyretic meds for comfort + fever → this wont PREVENT seizure
- Antiseizure meds → needed more for complex febrile
- Distinguish fevers and seizures from other causes: Encephalitis, Meningitis

REYE'S SYNDROME

WHAT IS IT? A syndrome of **unknown origin** that causes **liver dysfunction** and **swelling of the brain** (cerebral edema)

- occurs more frequently during **flu season** → typically follows after a **flu infection** or other **viral infection**

KEY: ASSOSIATED WITH ASPIRIN USE (DO NOT give to babies)

"If it starts with an **A**. dont give it to your **bay-bay**"

SIGNS + SYMPTOMS:

- Profuse, effortless **vomitting** and lethargy
- **Neurologic:** delirium
  seizures
  coma
  ↑ ICP → **DEATH**

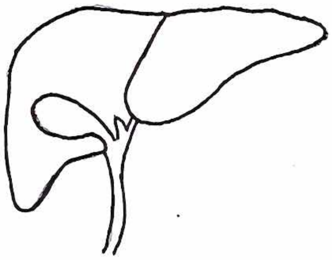
CAUSE: **UNKNOWN** but

may be induced by various viruses, drugs, exogenous toxins, ↑ serum ammonia levels

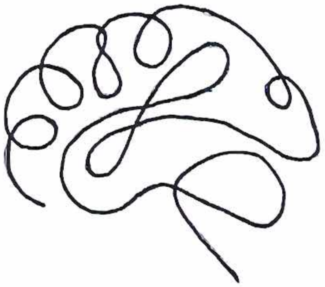
DX: Definitive diagnosis by **Liver Biopsy**

TREATMENT: **Earlier diagnosis → better outcome**

Medications: Mannitol (diuretic) → ↓ swelling in the brain
Vitamin K (increase clotting factors in liver)
→ related to treating liver dysfunction



- OT/PT: for pt with neural impairments
- Educate on **Aspirin** harm
- Keep pt hydrated → vomiting
- seizure precautions
- Raise HOB to semi-fowlers to reduce ICP
- Monitor pt pain level
- Monitor liver labs for prolonged bleeding (**PT/PTT/INR**) and liver dysfunction (**AST/ALT**)



NEUROVASCULAR ASSESSMENT

FRACTURES + RICE TREATMENT

WHY? When a patient suffers from a fracture that has been casted, we assess for the 5 P's:

- **P**ALLOR
- **P**AIN
- **P**ULSE
- **P**ARALYSIS
- **P**ARASTHESIA

To ensure the patients nerves and/or arteries are not pinched. If so, we worry about compartment syndrome → A MEDICAL EMERGENCY

AFTER a fracture, we encourage the RICE treatment:

- **R**EST → Rest injury for 24-48 HRS
- **I**CE → for 10-20 min every 4 HRS
- **C**OMPRESS → wrap injury with ACE → ↓ swelling
- **E**LEVATE → at or above the heart

Helps with pain, swelling, healing, and maintaining skin integrity

CHILDHOOD SYNDROMES

NAME	INHERITANCE	SIGNS/SYMPTOMS
Patau's Syndrome	Trisomy 13	Intellectual disability, small head, small eyes, cleft lip, clenched hands, malformed ears
Edward's Syndrome	Trisomy 18	Intellectual disability, small head, small jaw, clenched hands, overlapping fingers, malformed ears • Typically die in utero; many born will die within 1st week of life
Down Syndrome	Trisomy 21	Intellectual disability, flat face, almond shaped/upward slanting eyes, single palmar crease
Klinefelter's Syndrome	47 XXY ONLY MALES	Lack of development in testes, breast growth, tall stature, skeletal and cardio abnormalities, lack of testosterone, absent facial/body hair
Turner's Syndrome	45 X or XO ONLY FEMALES	Webbed neck, short stature, small breasts, infertility, small hips, hypertension, hypothyroidism, visual problems
Fragile X Syndrome	X linked	Long face, long ears, large testes, mild to moderate autistic behavior, attention deficit, shyness
Prader Willi Syndrome	Inactive paternal copy Chromosome 15	Hypothalamic dysfunction, severe obesity, constant hunger, short stature, low muscle tone, behavior problems
Angelman Syndrome	Inactive maternal copy Chromosome 15	Severe intellectual disability, ataxia, convulsions, excessive laughing, almost absent speech

OTITIS MEDIA

WHAT IS IT? Any inflammation of the middle ear

TYPES: Acute Otitis Media (AOM): infection of rapid onset and accompanied by fever + ear pain

Otitis Media with Effusion (OME): fluid in the middle ear space without acute infection symptoms (Ear feels "full")

CAUSES:

- Blockage of eustachian tubes which causes fluid to BUILD UP and sit in the middle of the ear → CAN GROW BACTERIA

KEY: Blockage may be: INTRINSIC (infection or Allergy; URI)
EXTRINSIC (enlarged adenoids, nasopharyngeal tumors)

RISK FACTORS:

- <7yo (more prevalent the younger you are)
- Children living with many family members (↑ Risk with smokers)
- Bottle fed baby → incline of feeding
- FHx ear infections
- Pacifiers, attending daycare
- Chronic allergies

KEY: 3mo-3yr the eustachian tube is more horizontal = ↑ Risk

SIGNS + SX:

- Ear pain → Tugging on ears
- Irritability, trouble sleeping
- Fever, N/V/D
- Problems hearing / conductive hearing loss
- Purulent discharge

OME: Rhinitis, cough + other sx

DIAGNOSTICS:

- Assessment of Tympanic membrane

AOM: Red, opaque, bulging or purulent

OME: Orange, fluid buildup

- Clinical sx

TREATMENT:

MAIN COMPLICATION: PERFORATION + HEARING LOSS

① **KEY:** Teach to wait ~72hrs for spontaneous resolution if absent severe s/s in pt's >6mo old.

IN PT'S <6mo old OR persistant severe s/s (fever + severe ear pain):

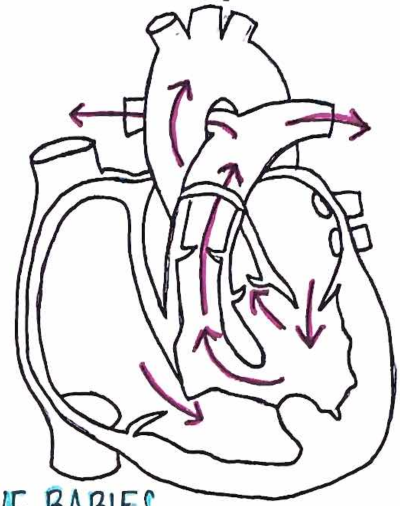
First line: Amoxicillin ORAL
Second line: cephalosporin
→ Eardrops wont do anything! (unless perforation)

② Supportive care: Acetaminophen for pain/fever, clean external ear from drainage
Avoid water in ear

③ Surgical: Tympanostomy (Tubes)
Myringectomy

CONGENITAL HEART DISEASE

WHAT IS IT? When the heart develops **improperly**, the blood flow to and from the heart is often **disrupted**. **congenital = since birth**



TYPES:

Heart Defects are categorized based on **flow pattern**:

① Right-to-Left Shunt: FOUR T's

- Tetrology of Fallot ┐
- Tricuspid Atresia ┘ ↓ Pulmonary blood flow
- Truncus Arteriosus – ↑ Pulmonary blood flow
- Transposition of the great vessels – Normal blood flow (arteries are just switched)

AKA: BLUE BABIES

② Left-to-Right Shunts

- Ventricular septal defect (VSD)
- Atrial septal defect (ASD)
- Patent Ductus Arteriosis (PDA)

Acyanotic
↑ Pulmonary blood flow
Heart Failure

AKA: HOLES IN THE HEART

③ Obstructive Defects:

- Pulmonary stenosis ┐
- Aortic stenosis ┘ ↓ Pulmonary and Aortic blood flow

Narrowing of an opening → ↑ work of heart

- STENOSED = DOESNT MOVE

RISK FACTORS:

1. From **mama** to **baby** during pregnancy:
   - Infection (Rubella)
   - Alcohol / Drug Use
   - Diabetes
2. Genetics:
   - Family history of heart disease
   - Down syndrome
   - congenital chromosome abnormalities

COMPLICATIONS:

- Heart Failure
- slower growth + development
- cyanosis
- stroke
- Rhythm Problems
- Lifelong follow up

TRICUSPID ATRESIA + TOF

What do these have in common? They are both defects that cause DECREASE in pulmonary blood flow from the right side of the heart to the left

AKA: Deoxygenated blood (from the right side) typically flows through the lungs to become oxygenated and then pushed out of the aorta

RIGHT-TO-LEFT SHUNT means the deoxygenated blood BYPASSES the lungs and is shunted directly into the left side to go into circulation to the body

⇓

Lack of oxygen to the body = **BLUE BABIES**
Decreased pulmonary blood flow

KEY: Defects caused by ↓ pulmonary blood flow will also have ASD or VSD as means of compensation

TYPES:

TRICUSPID ATRESIA

WHAT IS IT? Birth defect causing complete closure of the tricuspid valve
→ cause MIXED blood flow (oxygen rich + oxygen poor)

AKA:
The blood from the RA cannot enter the RV
⇓
so, in order for the blood to pass through, we will see an ASD

MEMORY TRICK: "TRI = 3" → 3 problems: RA, RV, ASD

S/S: CYANOSIS, dyspnea, ↑HR, hypoxemia, clubbing fingers, poor feeding, extreme sleepiness

TX: 3 STEP SURGERY:

1. 2 WKS OLD: shunt placement (aorta to pulmonary artery)
2. 4-6 MO OLD: Glenn Procedure
   connect pulm. Artery to SVC
   → Allows blood coming back from the body to go to lungs
3. 2 YR OLD: FONTAN Procedure
   connect pulm artery with IVC
   → oxygenated + deoxygenated no longer mix!

TETROLOGY OF FALLOT (TOF)

WHAT IS IT? Birth defect with 4 complications:

1. VSD
2. Pulmonary stenosis
3. overriding of the aorta
   → aortic valve is on top of the VSD
4. ventricular hypertrophy

ALL 4 cause mix of oxygenated + deoxy.

MEMORY TRICK: "TETRA = 4" → 4 problems

S/S: "TET" SPELL → Turning blue while crying or feeding
- cyanosis
- systolic murmur "Whoosh"

TX: surgery soon after birth
- Placement of shunt + closure of VSD = ↑ blood flow to lungs and body!

BOTH: Risk for → seizures, Endocarditis, Heart arrythmias

ASD, VSD, PDA
CONGENITAL HEART DEFECTS

- Atrial septal defect **(ASD)**
- Ventricular septal defect **(VSD)**
- Patent Ductus Arteriosus **(PDA)**

What do they all have in common?
They all **INCREASE** pulmonary blood flow from the **left side** to the **right side**

- Blood from the **LEFT side** of the heart is typically **oxygenated** and pushed **out of the heart** to **oxygenate** the **body**

LEFT-TO-RIGHT SHUNT means that the **oxygenated blood** shunts **BACK** into **pulmonary** circulation

AKA: A BACK LEAK OF BLOOD →

⇩

Reoxygenates already **oxygenated blood** ӫ
- increases pulmonary blood flow
- NOT A CYANOSIS PROBLEM

⇩

Pulmonary circulation recieves **NOT ONLY** the blood from the **Right side** **BUT ALSO** the **additional blood** entering through an **ASD, VSD** or **PDA**
- ↑ **blood volume** → ↑ work of the heart
  RISK: heart failure

TYPES:

VSD

A hole between the **Right** and **left VENTRICLE**

S/S: HARSH, LOUD MURMUR on left sternal border
- shortness of breath
- poor feeding, easy fatigue
- Reoccurant pulmonary infection
- Heart Failure

TX: closes spontaneously <u>OR</u> surgical (patch the hole)

ASD

A hole between the **Right** and **left ATRIA**

S/S: LOUD, HARSH MURMUR with fixed split S2
- shortness of breath
- Fatigue → Tires easily when feeding
- ↑ HR, poor growth
- Heart Failure

TX: closes spontaneously <u>OR</u> surgical (patch the hole)

PDA

An opening between the **PULMONARY** artery and the **AORTA**

S/S: MURMUR
Tachycardia
↑ Pulse Pressure
Bounding pulses
Heart Failure

TX: INDOMETHACIN (NSAID) will help close <u>OR</u> surgery

PULMONARY + AORTIC STENOSIS

WHAT IS AN OBSTRUCTIVE DEFECT? When blood attempts to leave the heart and meets an area of narrowing

AKA STENOSIS → blood flow is blocked or obstructed

The cusps of the valves may be:
- › DEFECTIVE
- › TOO THICK
- › MAY NOT SEPARATE FROM EACHOTHER

Blood flow before Defect

DEFECT (During fetal development)

Blood flow ↓ after defect

⇒ DECREASED CARDIAC OUTPUT :(

TYPES: (Typically paired with PDA)

PULMONARY STENOSIS

WHAT IS IT? When the pulmonary valve (the valve between the right ventricle + pulmonary artery) is TOO STIFF, NARROW OR SMALL

→ Reduces blood flow to the ventricles

SIGNS + SYMPTOMS:
- › HEART MURMUR - systolic ejection murmur
  - -whooshing sound
- › cyanosis, SOB, ↑HR
- › cardiomegaly → Enlarged heart
- › Heart Failure
- › Many children are ASYMPTOMATIC

DX: Auscultation
EKG, Echocardiogram
cardiac cath

TX: Balloon angioplasty → dilates the narrowed area
- › Pulmonary valvectomy → remove the valve and a patch is put in place
- › Pulmonary valve replacement

AORTIC STENOSIS:

WHAT IS IT? Narrowing of the aortic valve (the large blood vessel branching off the heart - aorta)
- › OR stiffness of the valve cusps
- › SEVERE = LIFE THREATENING

→ Reduces blood flow to the body

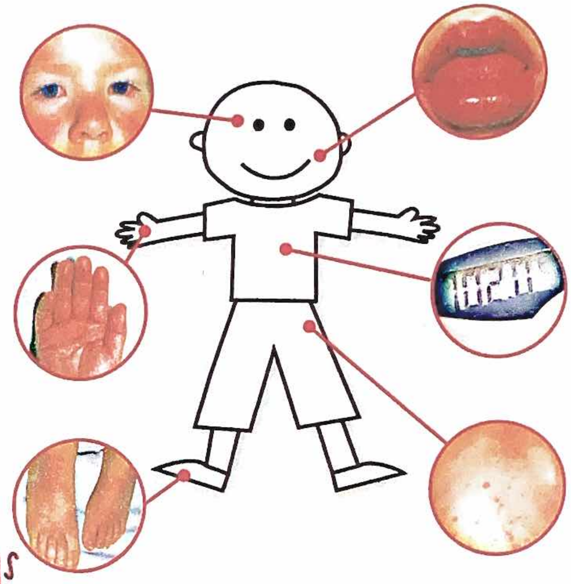
SIGNS + SYMPTOMS:
- › HEART MURMUR - systolic ejection murmur
  - -heard best over AORTA
- › INFANTS: hypotension, tachycardia poor feeding tolerance
- › CHILDREN: intolerance to exercise dizzy, chest pain

DX: Auscultation
EKG, ECHOcargiogram → Findings may not be spesific to aortic sten.
cardiac catheterization

TX: Balloon Angioplasty
Aortic valvectomy
Aortic valve replacement

KAWASAKI DISEASE

WHAT IS IT? swelling + inflammation in the walls of arteries throughout the body



- Primarily affects **children**
- Tends to affect the **coronary arteries**
- Affects **mucocutaneous lymph nodes**
  → glands that swell during infection

CAUSE: UNKNOWN

SIGNS + SYMPTOMS: OCCURS IN 3 PHASES

1ST PHASE: ACUTE

- **Fever** 38.9°C (102.2°F) for at least **3-5 days** that is unresponsive to antipyretics
- **Red eyes, lips, swollen tongue**
- **Red, swollen palms of hands + feet**
- **Rash**, lymph enlargement, irritability

2ND PHASE: SUBACUTE

- Fever resolved
- **Peeling** on palms + soles of feet
- GI upset, joint pain

3RD PHASE: CONVALESCENT

- S/S typically resolve
- Takes **6-8 WKS** from onset

RISK FACTORS:

AGE: Children <5yo

GENDER: Boys are more likely than girls

RACE: Asian or pacific island descent

KEY: **TREATABLE** → most children recover without serious issues

- **ONLY FEW** children have lasting damage related to the heart

TREATMENT:

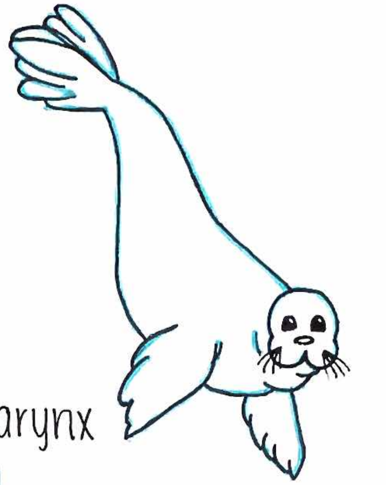
GOAL: lower fever + prevent heart damage

1. **GAMMA GLOBULIN (IV)** within first 7days of onset
   → ↓ Risk of heart problems
2. **ASPIRIN** to treat inflammation, pain and fever
   → Watch for s/s of Reyes syndrome

TIP: If giving gamma globulin, wait to recieve chickenpox and measles vaccine for **11mo**

- **Monitor heart**

CROUP



WHAT IS IT? An upper airway infection that produces a characteristic **"barking" or "seal-like"** cough

PATHOPHYSIOLOGY:

1. The child begins with a **viral infection** of the nasopharynx
2. The viral infection spreads to the **larynx** and **trachea**
3. **inflammatory response** occurs causing tracheal walls to swell and vocal cords to become impaired
4. This edema will significantly **restrict airflow** in a child's airway
5. **croup develops:**
   - hoarse voice
   - barking cough
   - inspiratory stridor
   - ↑ work of breathing

KEY: Most common infectious cause of airway obstruction in **small children + infants → small diameter** of the airway
- Affects mostly **6mo–3yo** children

CAUSE: most often caused by the **PARAINFLUENZA VIRUS**

COMPLICATION: **excessive swelling** that interferes with breathing
- bacterial infection of the trachea

SYMPTOMS:

MILD
- **Barking** cough
- Fever ↓ **aggrivated with crying**

MODERATE
- Mild sx
- inspiratory stridor
- ↑ Respiratory effort
- Trachial Tug

SEVERE
- Mild sx
- Moderate sx
- severe retractions
- Restless, agitation
- Hypoxia, ↑HR, ↓LOC

⇓

- **immediate resuscitation**
- O_2
- Nebulizer
- steriods

Typically, recovery from **home** unless severe

TREATMENT:
- steroids to ↓ swelling
- Fluids IV **(NOT ORAL)**
- Reassurance

ACUTE RESPIRATORY INFECTIONS

① BRONCHIOLITIS: viral infection of the bronchioles caused by RSV

KEY: By 3yo, most children have been infected at least once

S/S: Fever, Tachypnea
Dry cough, wheezing, rhinorrhea
Poor feeding, labored respirations

› occurs primarily in WINTER!

CARE: O_2 (Humidified), MIST
suction nasopharynx
↑ fluids

② INFLUENZA: viral infection that attacks the nose, throat and lungs

KEY: Most severe in infants (<6mo) and less severe in children <5yo

S/S: fever, chills, malaise
body aches, dry cough
dry mucous membranes

› spread by direct contact
› Most infectious 24hr BEFORE + AFTER onset of symptoms

CARE: Rest, increase fluids
› Antiviral meds WITHIN 48hr from ONSET of symptoms!
→ After, effectiveness is limited

PREVENTION: Annual vaccine >6mo old

③ PERTUSSIS: Highly contagious bacterial infection caused by the Bordatella pertussis bacteria

KEY: Primarily affects children <4yo who are not immunized
› Life threatening in infants

S/S: once infected, may take up to a week for symptoms to appear
› May first manifest as the common cold: rhinorrhea, nasal congestion, cough
› 1-2WKS later, S/S may worsen: THICK mucous accumulates
› uncontrollable coughing → vomiting
› extreme fatigue
› classic "whoop" breath sound
› INFANTS <6mo → may not cough at all → COMMON: APNEA
› ADOLESCENTS → may only have a persistant cough + NO WHOOP
› SX can last up to 6-10WKS

TREATMENT:
› Droplet Precautions
› Supportive care → ↑ fluids, antipyretics
› Educate on frightening "whoop" sound
› Watch timing of apnea → Long periods need hospitalization
› Antibiotics
› Child is infectious until 5days of Abx OR 3WKS if no Abx are taken

COMPLICATIONS:

YOUNG CHILD: seizures, PNA
intracranial bleeding

OLDER CHILD: Rib Fracture, PNA
syncope

ACUTE RESPIRATORY INFECTIONS

④ BACTERIAL PNEUMONIA: Bacterial lung infection caused by **streptococcus** or **mycoplasma bacteria**

KEY: This infection typically **follows a viral infection** that disturbs the natural defense mechanism of the upper respiratory tract

S/S: High fever, chills
Chest pain, tachypnea
cough → may be productive
Fatigue, ↓ appetite, lethargy
May cause respiratory distress
↳ Retractions, shallow breathing

› should be **hospitalized** if:
- **<6 mo old**
- moderate respiratory distress
- Hx of chronic illness
- pleural effusion occurs

CARE: sputum sample for testing, **THEN:**
› **Antibiotics**
› Antipyretics
› O_2, ↑ fluids (IV) → oral ok if able to tolerate
› Nebulizer or cool mist humidifier for thick secretions

⑤ VIRAL PNEUMONIA: Viral lung infection typically caused by **RSV in infants** → OR influenza, enterovirus, adenovirus in **older children**

KEY: **More frequent** than bacterial and seen in children **all ages**

S/S: symptomatic → **Abx do not treat viruses** → we treat symptoms with **supportive care:**
› High fever, dry cough
› Tachypnea, chest pain
› Fatigue, ↓ appetite, restless
› May cause respiratory distress
↳ crackles, nasal flaring, ↓ Breath sounds
› irritable, restless

CARE: FOR VIRUSES:
› O_2, ↑ fluids, cool mist humidifier
› postural drainage
› Antipyretics

CYSTIC FIBROSIS

WHAT IS IT? An inherited disorder that affects the **exocrine glands** in the lungs and digestive system

WHAT HAPPENS? Cystic fibrosis affects the cells of **exocrine glands**, which typically **produce mucus, sweat + digestive juices**

- **NORMALLY** these fluids are **thin** and **slippery**
- **IN CF**, the secretions become **sticky** and **thick** → plugs tubes, ducts and passageways

KEY:
- Median life expectancy: **37yo**
- Typically detected in **first year of life** →
- **AUTOSOMAL RECESSIVE**
- severity **varies** for each patient

Earliest Postnatal sign:
- **MECONIUM ILEUS** - blockage of small intestine with thick meconium

COMPLICATIONS + SYMPTOMS BY SYSTEM:

① EARLIEST SIGN:

Meconium Ileus →
- failure to pass stools
- Abdominal distention
- Vomiting
- Rapid dehydration

② RESPIRATORY:

Thick, sticky mucus builds up and causes **obstruction** in **bronchioles**
- wheezing, emphysema
- air trapping, atelectasis
- recurrent lung infections and upper sinus issues
- Nasal polyps, stuffy nose/sinuses
- ↑ **RISK** of **INFECTION** (mucous is just sitting there!)

③ SKIN:

sweat glands ↑ **sodium** in **salt + saliva**
- Risk electrolyte imbalance
- Baby's skin will taste **salty**

④ GI:

Thick mucus **plugs channels** that carry enzymes from **pancreas** to **small intestine**. → this will ↓ digestion and absorption
- **Enzymes** = Protease, amalase, lipase = digest vitamins, fats, proteins
- Greasy, foul smelling stools (bulky)
- constipation
- malabsorption of vit. A, D, E, K and protein
- poor weight gain in children → not digesting fats
- can lead to diabetes → pancreatic fibrosis

CYSTIC FIBROSIS

DIAGNOSTIC TESTING:

① Genetic Testing → looking for defective CFTR gene

② Sweat Chloride Test → measures the amount of salt in sweat
- uses Pilocarpine (chemical that makes skin sweat) + electric current
  - ↳ collects sweat on filter paper to measure electrolytes

<39 mmol/L = NEGATIVE
40-59 mmol/L = NEED FURTHER TESTING
>60 mmol/L = POSITIVE

③ OTHER: sputum test
Pulmonary Function Tests
Chest xray / CT scan

WHAT IS CFTR GENE?

- controls the sodium/chloride channels ↓
- when mutated, chloride gets trapped in cells ↓
- without proper chloride mvmt, water cant hydrate cells surface ↓
- Thick mucous forms

TREATMENT:

NO CURE, SO SUPPORTIVE CARE:

① Respiratory:
- Chest physiotherapy → drains airway of thick mucus by vibrating the chest to cough it up
  - 2-4x/day, ~20min → typically morning + night
  - Huff coughing
- Nebulizer → bronchodilators, mucolytics, antiinflammatories
- Aerobic exersice → Helps to clear mucus BUT ↑ RISK of salt loss with sweating
  - ADD salt + calories

② GI:
- Drink plenty of fluids
- stool softeners
- Monitor BG → may need insulin

KEY: Pt is immunocompromised
- Hand hygeine
- Vaccines recommended

③ NUTRITION:
- HIGH PROTEIN, CALORIES + FATS!!
- D, E, K, A vitamins
- Pancreatic enzymes → will help replace lost enzymes to ↑ absorption in the GI system
  - EX: Pancrealipase
  - Take before ALL meals
  - DO NOT give with milk products (will ↓ effectiveness)

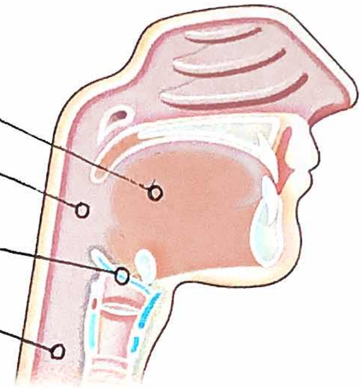
EPIGLOTTITIS

WHAT IS IT? Inflammation of the **epiglottis** that can lead to **life-threatening airway obstruction**

WHAT'S AN EPIGLOTTIS? A **flap** at the back of the throat that **prevents fluid/food** from entering the **trachea/lungs**

- **CLOSES** during **SWALLOWING**
- **OPENS** during **BREATHING**

SO, when the epiglottis is inflamed, the patient will have trouble **talking, swallowing** and **breathing**



CAUSES:

- Most common in children **2-5yo**
- **MOST COMMON CAUSE: HAEMOPHILUS INFLUENZA TYPE B (HIB)**
- Other cause: streptococcus pneumoniae

SIGNS + SYMPTOMS:

A: Abnormal position **(Tripod)**
D: Dysphagia **(DROOLING)**
D: Difficulty speaking **(frog-like)**

***Absent cough** as well!

A: Apprehensive/anxious
I: Irritable, ↑ Temp (fever)
R: **RAPID ONSET** (may wake up with sx)

N: Nasal flaring
U: Use of accessory muscles
R: Retractions
S: Stridor
E: Enlarged, Red Epiglottis

NURSING CARE:

KEY: **NEVER** insert anything into the patients mouth!
↳ **SPASMS** will **cut off airway**

- **NEVER** leave the pt alone
- Keep the pt calm → crying ↑ obstruction
- **Emergency airway equiptment Ready**
- Assess vital signs: O_2 status, RR, Breath sounds, Retractions, ↑HR, cyanosis
- **DO NOT PLACE SUPINE**
- NPO status
- **Medications:** Abx
  Antipyretics
  Corticosteroids for swelling

VACCINE:

- Prevented with **HIB vaccine**
- Given in **3-4 doses**
  - 2, 4, 6, 12-15 months

ASTHMA AND ASTHMA ATTACKS

WHAT? Chronic lung disease that causes **inflammation** and **narrowing** of the bronchi and bronchioles

DURING ASTHMA ATTACK:

1. **Smooth muscle** constricts causing chest tightness and dyspnea
2. **Mucosal lining** creates excess mucus production + inflammation
   - Decreases Air flow → coughing, wheezing, **AIR TRAPPING** (Respiratory Acidosis)
3. **Goblet cells** collect bacteria to prevent it from going into the airway

TRIGGERS:

- Smoke, **pollen**, pollution, perfume
- Dander, dust, pests, mold
- **cool and dry air**
- Respiratory infection
- **Exercise**
- GERD, Hormonal shift
- Beta blockers, NSAIDs, Aspirin, sulfites

SIGNS + SYMPTOMS:

EARLY:

- **SOB**, **wheezing**, easily fatigued
- cough at night, trouble sleeping
- sneezing, scratchy throat
- ↓ Peak Flow best

ACTIVE:

- **chest tightness**, Tachycardia, ↑RR
- cough, wheezing, dyspnea
- <90% O_2

SEVERE:

- Rescue inhaler **does not work**
- **cant speak**, chest retractions
- cyanosis of lips/skin, sweating

NURSING CARE:

- continuous vital signs
- Keep the patient **calm**
- **HIGH FOWLERS**
- **OXYGEN / BRONCHODILATORS**
- Assess lung sounds, cyanosis, ease of speaking, and Peak Flow best

PEAK FLOW:

PERSONAL BEST: Highest # over a **2-3WK** period when asthma is controlled

GOOD: 80-100%

CAUTION: 60-80%

DANGER: <60% → GO to Doctor!

Acute Attack: FAST RELIEF

1. Albuterol → Bronchodilator
2. Ipratropium

Long Term Control:

1. Salmeterol
2. corticosteroid (-SONE)
3. Montelukast Oral

SUDDEN INFANT DEATH SYNDROME

WHAT IS IT? **sudden death** of an infant younger than **1 year old** that remains **unexplained**

RISK FACTORS:

- AGE: 1-6mo (↑RISK)
- PRETERM
- Boys > Girls
- Family History
- Low socioeconomic status
- smoking in the household
- CO-SLEEPING, soft bedding
- Baby sleeping on stomach or side
- illness
- stuffed animals

TRIPLE RISK MODEL:

1. HIGH RISK INFANT
2. ENVIRONMENTAL FACTORS
3. PHYSIOLOGICAL CHANGES

THERE ARE NO SIGNS + SYMPTOMS

→ UNEXPECTED DEATH

→ Leading cause of death in infants

INTERVENTIONS:

- Perform a thorough history
- Autopsy
- samples of infant clothing / bedding may be tested
- EDUCATE about RISK of prone sleeping
- Reassure family that its nobody's fault
  - → offer support with grieving

PRONE = BAD (↑RISK)

GASTROINTESTINAL DISORDERS

① CLEFT LIP AND PALATE

WHAT: openings or splits in the upper lip, the roof of the mouth, or BOTH
HOW: Facial structures dont form properly in utero
TX: Assess suck, swallow and breathing abilities
Risk for otitis media and hearing loss
Hold infant upright in feeding, small amounts, burp frequently
surgery- cleft lip (3-6mo old), cleft palate (<12mo old)

② ESOPHAGEAL ATRESIA

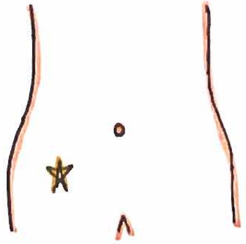
WHAT: Esophagus ends before reaching the esophageal sphincter that connects to the stomach
› causes food to NOT pass through to the stomach + trouble breathing
S/S: Frothy saliva and drooling
3 C's → coughing (during feeds), choking, cyanosis
Abdominal distension, respiratory distress

③ GERD

WHAT: Backflow of gastric contents into the esophagus
S/S: regurgitation, heartburn
anemia, hematemesis
POOR WEIGHT GAIN
TX: baby positioning, ↑HOB
antacids, PPI, solids given first
WATCH RISK: Esophagitis
Esophageal strictures
Aspiration PNA

④ APPENDICITIS

WHAT: inflammation of the appendix; appendix fills with pus
RISK: PERFORATION → peritonitis → sepsis → DEATH
S/S: McBurney's Point → Pain that descends to the RLQ
"Think" **Burn**ing pain
Referred pain
Rebound Tenderness
Fever, ↑WBC



NEONATAL JAUNDICE

WHAT IS IT? Yellow discoloration of the newborn's eyes and skin due to EXCESS BILIRUBIN in the blood

WHAT IS BILIRUBIN? A substance that is produced and released with the breakdown of RBC's in the liver → Travels from the liver and stored in the bile duct → expelled in stool

CAUSES:
Newborns produce more bilirubin than adults (faster breakdown of RBC's) → IMMATURE LIVER cant break down that fast

OTHER CAUSES:
- Internal bleeding
- Infection / sepsis
- Rh incompatability
- Biliary Atresia
- Liver Dysfunction

TYPES:

① PATHOLOGIC – Not Normal
- **ONSET:** FIRST 24 HOURS
- **CAUSE:** Typically either sepsis or blood disease (ABO, Rh incompatibility)

② PHYSIOLOGIC – very common
- **ONSET:** 2-14 days old
- **CAUSE:** immature liver has a tough time breaking down RBC and handling lots of bili
- **BREASTFEEDING** – common

③ PROLONGED – Further Testing needed
- **ONSET:** >14 days old
- can continue for 4-5 weeks
- May indicate underlying condition:
  - Hypothyroidism
  - Biliary Atresia
  - Cystic Fibrosis

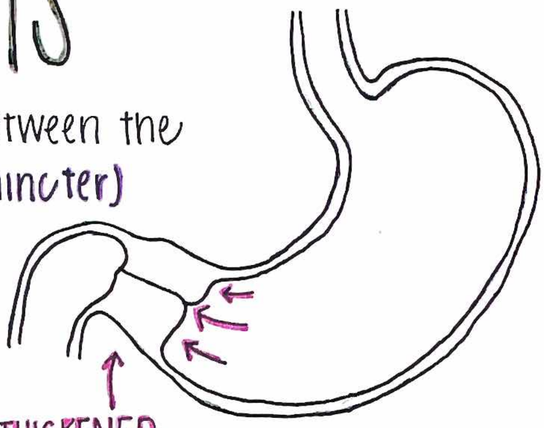
VERY COMMON IN NEWBORNS TERM AND PRETERM

SIGNS + SYMPTOMS:
- **#1: Jaundice** skin and sclera
- Poor feeding + gaining weight
- High pitch cry, Lethargic
- Pale stools

DX:
Presenting symptoms and bilirubin level in blood
- serum bilirubin
  - **NORMAL BILI: <5mg/dL**
- LFT's, TORCH screen → look for underlying issue

TREATMENT:
- **PHOTOTHERAPY:** light converts unconjugated bilirubin into a harmless substance that can be excreted
  - Baby must be naked with protective eyewear + only diaper
- **NUTRITION:** continue breastfeeding!
  - may need more frequent feedings
- **TRANSFUSION:** May be due to blood incompatibility with mom
  - **1st:** IVIg transfusion
  - **2nd:** blood transfusion

PYLORIC STENOSIS



WHAT IS IT? A condition that makes the valve between the stomach and small intestine **(Pyloric sphincter)** **thicken** and **narrow** → **blocks food passage**

KEY: Does NOT present at birth → infants feed **WELL** for the first **few weeks** of life
- **ONSET:** ~2WKS–2MO of life
- **CAUSE:** UNKNOWN

RISK FACTORS:
- SEX: more often in **males**
- Premature babies
- Family Hx
- smoking (↑ RISK) during preg.
- Early Antibiotic Use

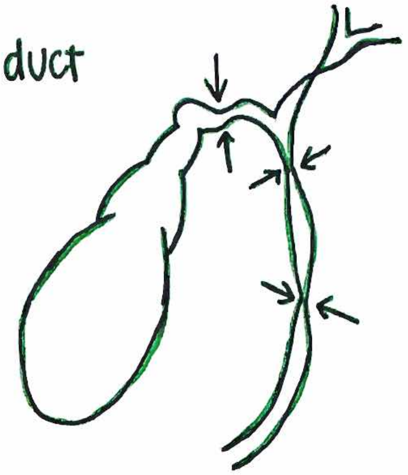
COMPLICATIONS:
- Failure to grow
- Dehydration → electrolyte imbalance
- stomach irritation → bleeding
- Jaundice (Rare)

DIAGNOSIS:
- Physical Exam → **OLIVE MASS** or visible **peristaltic waves**
- Blood tests → check for dehydration and electrolyte imbalance (ABG)
- Ultrasound or xray

SIGNS + SYMPTOMS:
- **Vomiting after feeding** → This is soon after feeding so it will be food, **NOT BILE (nonbillious)**
- **Persistant hunger**
- ↓ weight + weight gain
- visible peristalsis → stomach muscles are trying to push food
- Dehydration + constipation
- Epigastric mass **AKA olive mass**

TREATMENT:
- **Rehydrate!** → Fluid and/or electrolyte replacement
- **SURGERY: PYLOROMYOTOMY**
  - only cuts the outside layer of muscle
  - minimally invasive procedure
  - can begin feeding a few hours after
- **Assess** elimination patterns before and after surgery
- **Assess** hydration status → irribability, pulse rate, mucous membranes, fontanelles

BILIARY ATRESIA



WHAT IS IT? A blockage or deformity of the **bile duct** that occurs in **infants soon after birth**

BILE DUCT: a **tube (duct)** that runs from the **liver** and **gallbladder** to the **small intestine** to move bile through. Bile will help aid in **digestion** of fats in food

DX:
based on **history, physical findings** and **labs** (CBC, electrolytes, billi, and LFT's)
can do exploratory surgery to examine liver + bile ducts

CAUSE: UNKNOWN
- possibly acquired in late gestation and manifested a few weeks after birth
- possibly **inflammation** after birth that leads to destruction of bile ducts

SIGNS + SYMPTOMS:
Earliest Manifestation: JAUNDICE (will persist beyond **2wks old**)
↳ Bile builds up → pressure ↑ → Bile **leaks** into blood which ↑ bilirubin

- Dark yellow urine
- White/Tan stool
- Hepatomegaly, Abdominal Distention
- poor fat metabolism → poor weight gain
- irritable
- splenomegaly (occurs later)

TREATMENT:
CRITICAL to get early diagnosis **(before 2mo old)**
- outcome is better

① **Surgery - Kasai Procedure**
- Remove damaged bile duct and join liver and intestine directly
  - Drains bile → **OFTEN NEED LIVER TRANSPLANT BY 2YO**

② **supportive care**
- vitamins A, D, E, K, iron, zinc
- TPN or gastrostomy if severe failure to thrive

③ If untreated, can lead to cirrhosis → liver failure → **DEATH**

HEPATITIS

INFLAMMATION OF THE LIVER CAUSED BY A VIRAL INFECTION

	A Acute ONLY	**B** Acute & Chronic "B" is in the middle of "A" and "C"	**C** Acute & Chronic 75-85% turn chronic	**D** Acute & Chronic "B" and "D" are **B**est bu**D**s	**E** Acute ONLY
Transmission	Fecal-Oral Route	**B**ody fluids, **B**lood, **B**irth, Sex	Body fluids, Blood Most Common: IV Drug Use	**B**ody fluids, **B**lood Most Common: middle east, Mediterranean, Europe	Fecal-Oral Route (uncooked meats, 3rd world countries)
Signs and Symptoms	• N/V/D • Abd pain • **Jaundice** • Dark Urine • Joint Pain • Fever/Fatigue				
Diagnostic testing	Anti-HAV: antibodies detected (+) IgM – active infection (+) IgG = "Gone" – recovered or immune	Anti-HBs: previous/immune HBsAg – active infection	Acute <6mo Chronic: Anti-HCV: antibodies detected	Anti-HDV: antibodies detected	Anti-HEV: antibodies detected
Treatment	**Acute:** none Recover on own	**Acute:** none Recover on own **Chronic:** • Antivirals • Interferons (Peginterferon-alpha 2a)	**Acute:** Rare but treated like chronic **Chronic:** • Antivirals (ribavirin) in conjunction with an interferon	**Acute:** none Recover on own **Chronic:** • Antivirals • Interferons	**Acute:** none Recover on own
Prevention	**1.** HepA vaccine: pediatric schedule **2.** If exposed: PEP within 24hr **3.** Hand hygiene	**1.** HepB vaccine: pediatric schedule, jobs, adults with diabetes **2.** If exposed: PEP within 24 hours **3.** Hand hygiene **4.** Safe sex	**NO VACCINE OR PEP!** **1.** Hand hygiene **2.** Sharp precautions **3.** Blood and organ donor screening	**1.** HepB vaccine: occurs in the presence of B! **2.** Hand hygiene	**NO VACCINE!** **1.** Cook meat **2.** Hand hygiene

Function of the liver:

- Filter blood
- Metabolize drugs
- Bile production for fat
- Stores sugar, vitamins, minerals
- Coagulation
- Breaks ammonia into urea

Teach:

- **H:** hand hygiene
- **E:** eat low fat/high carbs
- **P:** personal hygiene products do NOT share
- Rest → for the liver
- Small meals
- Avoid alcohol, aspirin, acetaminophen, sedatives
- SubQ interferon injections

ALL ABOUT INSULIN

RAPID-ACTING

1. Aspart
THINK: "Move your Ass" → Ass-part

2. Lispro
THINK: "Let's go!!" → Lispro

3. Glulisine
THINK: Glue dries fast

Onset: 15 MIN!
Peak: 30-90 minutes
Duration: 3-5 hours

SHORT-ACTING

AKA: Regular Insulin

KEY: This is the ONLY insulin type given IV route

- Can be given with NPH at the *same* time in the *same* syringe
- Can be given with long-acting at the *same* time in a *different* syringe

Onset: 30-60 minutes
Peak: 2-4 hours
Duration: 5-8 hours

INTERMEDIATE-ACTING

AKA: NPH

KEY: If given with regular insulin, draw up: **clear-to-cloudy**

THINK: R-N → Regular *before* NPH (clear before cloudy)

- Given 2x/day

Onset: 60-120 minutes
Peak: 4-12 hours
Duration: 14 hours (hence, given 2x/day)

LONG-ACTING

KEY: NO PEAK

- CAN'T BE MIXED WITH OTHER INSULIN!

1. Detrimir
THINK: "Lasts all year" → lasts a long time

2. Lantus
THINK: "Lantern" → lanterns burn for a long time

3. Glargine
THINK: "Large" → lasts for a large amount of time

Onset: 60-120 minutes
Peak: NO PEAK
Duration: 24 hours

WHEN DO YOU EAT?

1. Rapid-acting: Covers insulin needs for meals eaten at the *same* time of injection

2. Short-acting (Regular): Covers insulin needs for meals eaten within *30-60 minutes* of injection

3. Intermediate-acting (NPH): Covers insulin needs for *half* the day or overnight; typically given morning and night

4. Long-acting: Covers insulin needs for the *full* day; can be combined with other insulin but never mixed

RULES OF INSULIN

- Watch for signs and symptoms of hypoglycemia → shaky, clammy, pale, sweaty
  - THINK: "Cool and clammy, give me candy"
  - IF *AWAKE:* Ask the patient to eat (candy, juice, low fat milk)
  - IF *UNCONSCIOUS:* Stab with IV D50
- Regular insulin: ONLY insulin given IV
- NPH: If mixed, clear-to-cloudy (NPH is cloudy)
- Long-acting: Do not mix; NO PEAK
- Rotate injection sites → do not aspirate/massage
- **Always** increase insulin with: (glucose↑with any type of stress)
  - Stress
  - Sepsis
  - Sickness
  - Steroids

REMEMBER

TYPE 1: YOU HAVE NONE

- NO insulin being produced
- Patients will need insulin!

TYPE 2: THE PROBLEM IS YOU

- Encourage healthy diet and exercise
- Potential oral medication use
- Insulin (last resort)

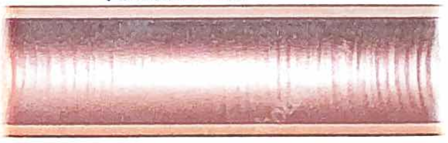
INSULIN PUMP

- Give a steady dose of insulin for Type 1 DM
- Check BG 4x/day
- Push bolus at meals

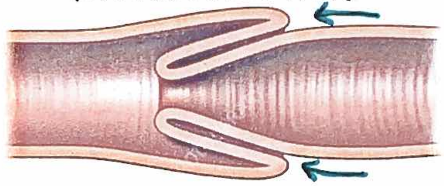
INTUSSUSCEPTION

WHAT IS IT? When a proximal segment of the bowel "telescopes" into a more distal segment

NORMAL



INTUSSUSCEPTION



WHAT DOES THIS DO?

- This pulls ALL lymphatic + venous vessels, which causes obstruction and ↓ blood flow
- This obstruction causes ↑ edema → ↑ pressure in the affected area
- ↓ circulation and blood flow = ischemia and secretion of mucous in the intestine
- Blood + mucous mix together = Red, currant jelly-like stool

CAUSE: UNKNOWN, but may be due to an abnormal growth in the intestine (tumor/polyp) that acts as a lead point to pull on when contractions happen

DIAGNOSIS:

- subjective findings
- confirmed by xray/CT or ultrasound

SYMPTOMS:

- sudden, acute abdominal pain
  - May pull knees to chest
- HALLMARK: currant jelly-like stool
- episodes of pain that come and go q15-20 min
- Abdominal mass (sausage shaped)
- vomiting, lethargy

RISK FACTORS:

- AGE: 6mo-3yo
- SEX: mostly in males
- Abnormal intestinal formation at birth
- FHx or prior hx of one

TREATMENT: A MEDICAL EMERGENCY

GOAL: avoid severe dehydration, shock + infection

- IV Fluids
- NG tube to decompress intestines
- Potential Antibiotics (infection)

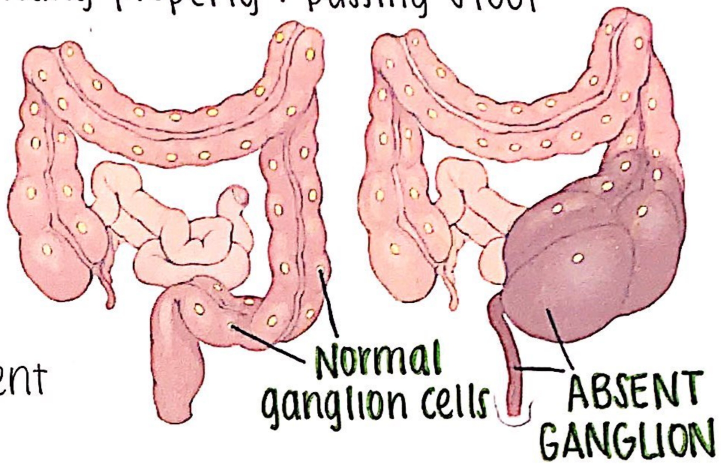
MEMORY TRICK:
Think: INCEPTION →
"A dream within a dream,
A bowel within a bowel"

- BARIUM ENEMA OR AIR ENEMA
  - Pressure will unfold the intestine
  - Monitor Bowel sounds after

IF this doesnt work:
SURGERY: manually reduce or resect the area

HIRSCHSPRUNG DISEASE

WHAT IS IT? Absence of nerve cell ganglia in the distal colon that keeps the intestines from working properly + passing stool



PATHOPHYSIOLOGY:

Normally, ganglion cells trigger a series of CONTRACTIONS + EXPANSIONS → PERISTALSIS → to move the food through the intestines ⇓

IN HIRSCHSPRUNG: Ganglion cells are absent at the end of the colon → AGANGLIONIC SEGMENT ⇓

1. Aganglionic segment and anal canal are unable to relax → ↑ PRESSURE
2. Peristalsis cant overcome this pressure

⇓

After birth, stool starts to build up → › clinical manifestations occur

TREATMENT:

- Stabilize fluid + electrolytes
- Low fiber, HIGH calorie + protein
- Frequent abdominal measurements
- Frequent enemas / irrigation to lessen irritation on colon

RISK: bowel perforation!
WATCH: fever, ↑ abd tenderness irritability, dyspnea

RISK: infection!
FREQUENT vital signs (for shock)

SURGERY: Remove the aganglionic portion

SIGNS + SYMPTOMS:

NEWBORN: Failure to pass meconium within 48 hours of birth
- Billous vomiting
- Trouble feeding
- Abdominal Distention / Pain

INFANT: Failure to thrive
- constipation
- Abdominal distention / Pain
- Diarrhea episodes
- signs of enterocolitis!!
  - Fever
  - Explosive, watery diarrhea

CHILDHOOD: Ribbon-like, foul smelling stool
- constipation
- Abdominal distention / Pain
- Palpable fecal mass
- Undernourished

CELIAC DISEASE

WHAT IS IT? Intestinal intolerance to **dietary gluten** that causes **damage to villi** in the small intestine

GLUTEN → wheat, barley, rye, oats

PATHOPHYSIOLOGY:

Gliadin is a component of gluten that is **toxic** and **damaging** to mucosal cells

⇩

Individual ingests gluten → **cant break up gliadin** correctly

⇩

Gliadin crosses the gut cells → immune response occurs

⇩

This **damages villi** of the small intestine, causes diarrhea, and builds **antibodies** for next meal

⇩

Malabsorption: ↓ electrolytes, protein, carbs and fat absorption

WHAT ARE INTESTINAL VILLI?

- **Finger-like projections** in the small intestine that aid in **absorption** and nutrients by increasing **surface area** for absorption
- Each villus has **enterocytes** that also help **absorb** food + aid in digestion

DX:

Typically dx when child is **1-5 yo** → This is when solids + new foods are introduced

Blood Test **>18mo**

⇳ **confirmation**: biopsy of small intestine showing changes in villi.

S/S: "MALNOURISH"

M- mouth ulcers
A- anemia → not absorbing proper vit for RBC prod.
L- Lactose intolerance
N- N/V/D
O- osteo changes
U- uncooperative behavior
R- rash
I- irritability
S- steatorrhea
H- hair loss

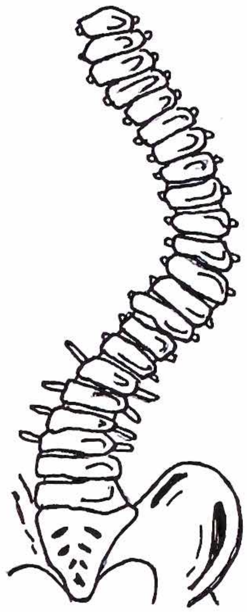
NURSING CARE:

- Help child adhere to diet
- **Assess** signs and symptoms (bloating, diarrhea, neuro)
- vitamin supplements

NO: barley, wheat, rye, oat, lactose*
YES: corn, rice
↑ calories and protein, ↓ fat and fiber

bowel is inflamed

SCOLIOSIS



WHAT IS IT? **Lateral curvature** of the spine that is developed during a child's growth spurt

- occurs in **females** more than males
- Typically **mild** but can worsen as the body grows

RISK FACTORS:

- Growth spurt before puberty
- **Female**
- Family Hx
- Neuromuscular conditions (cerebral palsy)
- spinal injuries

SIGNS + SYMPTOMS:

- **Uneven** shoulders, hips, ribs, scapula, waste
- clothes do not fit properly
- slight **limp**
- complaints of sore back

While most cases are **mild**, a child may suffer from: strain on the **heart + lungs**

- Ribs are pressing down on them
- chronic back pain
- Appearance issues

DIAGNOSIS:

- observing and palpating the spine with only underwear → **asymmetry** of shoulders + hips
- Bend forward → **asymmetry** or prominence of ribs
- **Movement** → limp, muscle weakness
- **XRay**

TREATMENT:

BRACE → worn day and night

- ↑**effectiveness** the longer its worn
- can take it off to play sports
- This is **NOT** a cure but will prevent further progression
- **stop using** braces when:
  - **2yrs** after girl begins **menstruation**
  - When **boys** and **girls stop growing**

SURGERY - **severe scoliosis**

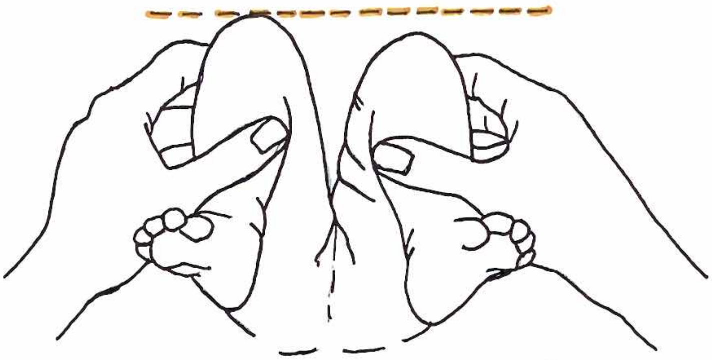
- **Most common** - spinal fusion
  - ↳ connects **2 or more** bones in the spine and place wire to keep it straight
- can use a **metal rod** at a **young age** → adjusted in length **as the child grows**

DEVELOPMENTAL DYSPLASIA OF THE HIP

WHAT IS IT? A condition resulting in **improper development** of the **"ball and socket"** joint of the **hip** (in **babies** and **young children**)

RISK FACTORS:

- Female gender
- Family history
- Babies born in the **breech position**
- Being the **first born** child
- Babies **swaddled tightly** with hips and knees straight



SIGNS + SYMPTOMS:

INFANTS

Asymmetrical **gluteal** and thigh folds
Reduced **abduction in hip** → one leg more flexible
Abnormally **short femur** → one leg is longer than the other

CHILDREN

- Walking on **tip toes** or with a limp
- **osteoarthritis** or **hip labral tear** → teenagers
- **Positive Trendelenburg sign** -when the pt adds weight to the affected side, the pelvis will **tilt downwards**

DIAGNOSIS:

- Moving the infants legs in a **variety of positions**
- **Difficult to diagnose** → start to cause problems the older you get
- MRI

TREATMENT:

0-6 MONTHS

- **PAVLIK harness** → **soft brace** that secures the ball portion of the joint firmly in its socket for **several months**

6MO- 2YRS

- **HIP SPICA CAST** → **reduction** of **bones** in place and placement of **cast** to hold them together for **several months**
- **Last resort** → **SURGERY** to fit the joint together

CARE

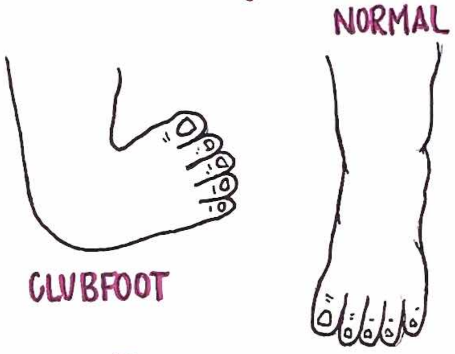
- Wear a **layer of clothing** under harness to prevent skin irritation
- **Frequent diaper changes** to prevent skin breakdown
- **Hydration and nutrition**
- Reposition **q2-4hr** to prevent pressure injury
- **Keep cast dry**
  - Assess groin and skin creases

CLUBFOOT

WHAT IS IT? A birth defect that causes deformity of the foot/ankle (twisted inward)

- Fairly common → Babies with clubfoot are otherwise healthy :)

THINK: "club" → looks like a golf club



DIAGNOSIS:
visual recognition at birth
May request x-rays for severity

SIGNS + SYMPTOMS:

KEY: clubfoot is NOT painful or uncomfortable

- Foot pointed downward and inward
- SEVERE: foot turned so much that it appears upsidedown
- calf on affected side may be underdeveloped
- leg on affected side may be slightly shorter

COMPLICATIONS:

at the age of walking

- less flexible
- shorter length
- shoe size
- Arthritis

RISK FACTORS:

- smoking during pregnancy
- not enough amniotic fluid during pregnancy
- associated with other congenital defects (spina bifida)
- Family history
- Boys are more likely

TREATMENT:

Begins as soon as possible:

1. Ponseti Method → stretching the joints and tendons with casting placement
2. surgery → lengthen the tendons or ligaments

- Recasting 1x/wk (for 6-10wks)
- Maintenance of the correction until normal muscle balance is regained

- Encourage stretching exercises
- PT and OT consults
- Maintain skin integrity in cast
  → watch for poor circulation
- Promote healthy body image

MUSCULAR DYSTROPHY

An inherited disease that **damages** and **weakens muscles** over time → changes in muscle and strength. This is caused by a genetic mutation in **DYSTROPHIN**. **No nerve damage!**

DUCHENNE

Dystrophin gene: **ABSENT** or **nonfunctional**

ONSET: <5YR OLD → more severe!

① **Short Term:** muscle regeneration (grow muscle fibers of diff. sizes) = NORMAL

② **Long term:** muscle atrophy (infiltrated by fat + fiber tissue) = WEAK

SYMPTOMS:

1. Proximal lower extremity and pelvis affected **FIRST**
2. Waddling gait
3. calf pseudohypertrophy (from fat/fiber tissue)
4. GOWERS SIGN → (hands on thighs to push to stand)
5. Walk on tiptoes, tripping/falling

LATER ON:
1. Wheelchair
2. Respiratory Failure
3. scoliosis
4. dilated cardiomyopathy
5. Arrythmias

DX: ↑ creatine kinase, mutations, biopsy

TREATMENT:

1. Glucocorticoids → **SE: weight gain**
2. Physical Therapy
3. **NO CURE** :(

BECKER

Dystrophin gene: **MISHAPEN** and **partially functional**

ONSET: adolescence or early adulthood
more mild!

SYMPTOMS:

1. Generalized weakness of hips, pelvis, thighs and shoulders **FIRST**
2. Waddling gait
3. calf pseudohypertrophy
4. walk on tiptoes, tripping/falling
5. NO RESPIRATORY SYMPTOMS

DX: ↑ creatine kinase, genetic testing, **Family history**

TREATMENT:

> same as **Duchenne** muscular dystrophy → **supportive care**

PIAGET'S STAGES OF DEVELOPMENT

Age	Piaget's Stage	Developmental Qualities
Birth – 2 years old	**SENSORIMOTOR STAGE** – the newborn is experiencing the world through senses and actions	• Object permanence • Stranger anxiety • Behaviors to noises • Develop our senses
2 – 6 years old	**PREOPERATIONAL STAGE** – representing the world symbolically (objects with words and images) but lacking logical reasoning	• Irreversibility • Pretend play • Egocentrism • Language development
7 – 11 years old	**CONCRETE OPERATIONAL STAGE** – development of logical thought about concrete events and grasps concrete analogies "If nothing is added or taken away, then the amount of something stays the same"	• Conservation (something can stay the same in quantity but look different) • Reversibility • Mathematics
12 years – Adulthood	**FORMAL OPERATIONAL STAGE** – able to think in an abstract manner (ex: beauty, love, freedom, morality)	• No longer limited by what is seen or heard • Can transcend a concrete situation and think about the future • Moral reasoning

TYPES OF PLAY BY AGE GROUP

Age	Type of Play	Description
0 – 2 years old	**Solitary Play**	Solitary → alone; child plays on their own even in a room full of children
2 – 2.5 years old	**Spectator Play**	Spectate → watch; child observes other children playing
2.5 – 3 years old	**Parallel Play**	Parallel → "next to;" child will play next to other children but not *with* them
3 – 4 years old	**Associate Play**	Associate → same; child will be playing the same activity as others but not working/associating together
4 – 6 years old	**Cooperative Play**	Cooperate → interact with others; children learn to play with others; using social skills to interact

ERIKSON'S STAGES OF DEVELOPMENT

Age	Basic Conflict	Important Events	Outcome (Favorable and Unfavorable)
Infancy: Birth – 18 months	Trust vs Mistrust	Feeding	**Favorable:** Children develop a sense of faith in the environment and to caregivers love and affection **Unfavorable:** Suspicion and fear of people/events
Early Childhood: 2 – 3 years	Autonomy vs Shame and Doubt	Toilet Training	**Favorable:** Children develop personal control over behavior and actions. Child feels adequate and independent **Unfavorable:** Feelings of shame and self-doubt
Preschool: 3 – 5 years	Initiative vs Guilt	Exploring	**Favorable:** Ability of the child to take initiative and be assertive. Leads to a sense of purpose **Unfavorable:** Feeling guilty and inadequate
School Age: 6 – 11 years	Industry vs Inferiority	Attending School	**Favorable:** Ability to learn and grow socially/academically (feeling competent) **Unfavorable:** Feeling inferior
Adolescence: 12 – 18 years old	Identity vs Role Confusion	Social Relationships	**Favorable:** Ability to see one's self as unique. Develop a sense of personal identity while staying true to yourself **Unfavorable:** Feeling lonely, isolated and confused

PEDIATRIC CPR

INITIAL STEPS

1. Scan the environment for safety
2. Check for response:
   INFANT (<1 year old) – Flick the bottom of the foot to elicit a response
   CHILD (1–Puberty) – "Are you okay?"
3. Call for help
   - Delegate someone else to call 911
   - Delegate someone else to get AED
   - In hospital – initiate rapid response
4. Assess breathing
   - Remove clothes if possible
   - For children AND infants: unresponsive, no breathing, gasping → not normal
   - No more than 10 SECOND assessment
5. Assess pulse
   - Infant: BRACHIAL
   - Child >1 year old: CAROTID
   - No more than 10 SECOND assessment

INITIATE CHEST COMPRESSIONS

- Child's spine is supported on a firm surface
- Rate: 100 – 120 compressions/minute
- Cycle: 30:2 → 30 compressions; 2 breaths; repeat FIVE cycles
- Minimize compression interruptions to <10 seconds → when assessing for pulse in between cycles
- Attach and use AED as soon as possible → resume compressions immediately after each shock
- Breaths: head-tilt/chin lift position
  - Observe rise in chest when initiating a breath → that's how you know how forceful you should be

Infants: lower sternum, midline, below the nipples (draw an imaginary line)

- Typically use two fingers
- Depth: 1.5in/4cm
- Breaths: use your mouth to cover infant mouth AND nose to initiate rescue breaths

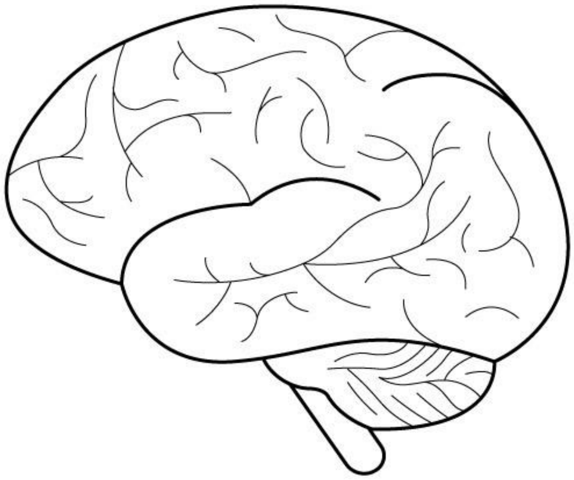
Child 1-8 years old: lower half of the sternum

- Typically use heel of one hand or two hands interlocked depending on size of child
- Depth: 2in/5cm (THINK: 2 hands or 5 fingers)

AED TIPS

- If NO pediatric pads available, adult pads can be used on a child 1–8 years old → placement may be different:
  - <1 year old → manual defibrillator is encouraged
  - 1–8 years old → place one adult pad on the front of chest and one on the back of chest
  - >8 years old → pad placement is the same as adults (high right/low left)

MENTAL HEALTH BUNDLE



THERAPEUTIC COMMUNICATION

REMEMBER:

- Communication is 10% verbal and 90% nonverbal
- Ensure ***clarity*** (the meaning of the message is accurately understood by both parties)
- Ensure ***continuity*** (promotes connections among ideas and the feelings, themes, or events)

THERAPEUTIC COMMUNICATION TECHNIQUES

Technique	Rationale
Active listening • Maintain eye contact • Face the patient at eye level • Uncrossed arms • Controlled voice, tone and speech	• Provides undivided attention to the client • Allows the client to feel seen, heard, and acknowledged
Open-ended questions	• Invites the client to provide a detailed answer • Facilitates open communication
Using silence	• Allows the client to reflect on their own thoughts
Accepting	• Establishes a trusting relationship/rapport
Offering self	• Shows interest in the feelings of the client
Offering general leads Giving broad openings	• Allows the client to take lead in the interaction
Making observations, restating, reflecting, seeking clarification	• Shows interest and attention to what the client has to say • Allows for clarification if the restated statement is incorrect
Exploring	• Encourages the client to provide more details without probing/demanding for more
Presenting reality	• Reorients the client to reality
Placing the events in time and sequence	• Allows the nurse to gain more clarity on the time frame of a specific problem
Suggesting collaboration	• Offering self to help solve client's problems but not solving for them or giving advice
Acknowledge and recognize cultural differences	• Validates and shows compassion towards cultural differences that may otherwise pose a boundary

NONTHERAPEUTIC COMMUNICATION TECHIQUES	
Technique	**Rationale**
Distracted or completing other tasks	• Does not show the client that you are actively listening • The client may feel like his/her feelings are unimportant
Close-ended questions (Why? Questions)	• The client may become defensive and uncomfortable • Judgmental
Giving premature advice	• Does not facilitate the client to explore solutions and techniques on their own
Minimize feelings	• May make the client feel like their feelings are invalid
Providing false reassurance	• Client will become anxious for results • Provides false hope of events if results don't happen like you promised
Probing	• Invasive, uncomfortable, threat to privacy
Agreeing or disagreeing	• Indicates the client is "right" or "wrong" • Does not facilitate reflection of actions
Changing the subject	• Indicates uninterest in client feeling's

Nurse-patient Relationship

Orientation: Introductory Phase

- Introduce self, establish rapport, establish boundaries, identify client problems, define goals *with* patient

Working Phase

- Perform ongoing assessment, behavior changes, guide client to examine feelings, develop coping skills, revise goals if needed

Termination: Resolution Phase

- Evaluate goal attainment, summarize client progress, establish reality of separation, appropriate close the therapeutic relationship

Barriers to Culture

Five areas that may prove problematic for the nurse when interpreting specific verbal and nonverbal messages

- Communication styles
- Use of eye contact
- Perception of touch
- Cultural customs (gender roles)
- Cultural Bias

INPATIENT	OUTPATIENT
• Designed to treat serious addictions or acute phase of mental illness	• Designed to treat mild addictions, substance abuse, or those in need of counseling
• Patient stays in the hospital or facility	• Office visits without overnight stay
• 24-hour nursing care & access to crisis care	• 10-12 hours of care a week
• Locked unites (for safety)	• Does not have locked units
• Higher success rate	• Lower success rate
• Disruptive to daily life	• Patient maintains a normal daily routine
CARE SETTINGS	
General Medical and Surgical Hospital with Psychiatric Unit • Usually less than 30 days • If long term care is needed, transfer to a psychiatric hospital or residential program	**Primary Care Medical Home** • Delivers integrated care between community services, home health care, and family involvement
Psychiatric Hospital • Treat mental illnesses exclusively • May provide longer stays compared to general hospital	**Partial Hospitalization Program** • "Day programs" • 6+ hours a day, everyday
Residential Treatment Program • Designed to make patients feel more comfortable and less like a hospital ward	**Intensive Outpatient Program** • 3-4 hours a day usually in the evening • Accommodate people who work during the day
Alcohol and Drug Rehabilitation Facility • Typically, 30 day treatment but may be individualized • Once released, the individual will begin AA/NA meetings on an outpatient basis	**Outpatient Clinic** • Apart of the hospital but does not require overnight stay **Community Mental Health Centers** • Accommodate low income individuals

Barriers to seeking mental health treatment:

- The nature of mental illness is misunderstood
- Psychosis impedes a person's ability to recognize the need for care
- Apathy is present; no motivation exists to seek care

Specialty Treatment may include:

- Pediatric Psychiatric Care
- Geriatric Psychiatric Care
- Forensic Psychiatric Care
- Veterans Administration Mental Health Services
- Alcohol and Drug Abuse Treatment
- Post-partum Psychiatric Care

BRAIN LOBES + FUNCTIONS

FRONTAL AKA EXECUTIVE FUNCTION

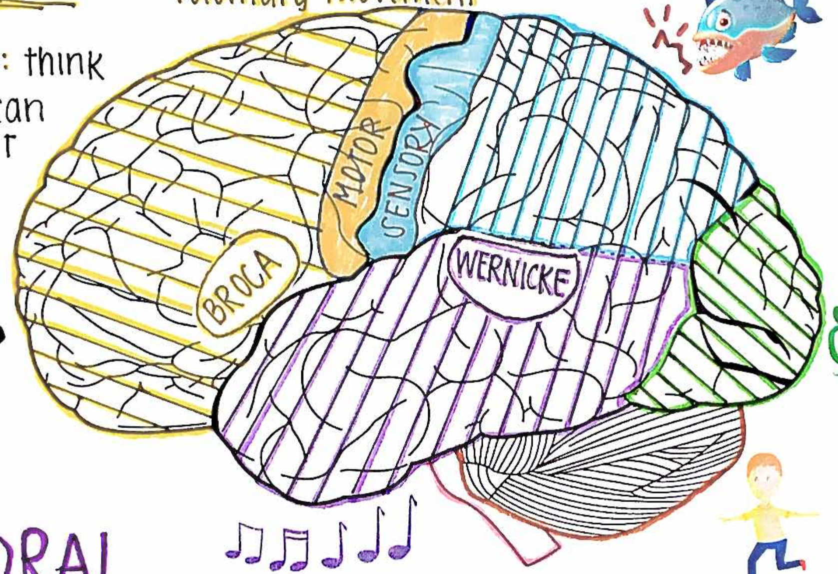
- problem solving
- concentration
- planning + organizing
- reasoning
- personality + behavior + mood
  Regulates emotion

TWO IMPORTANT PARTS:

① BROCA'S AREA
- controls expressive speech

{ IF DAMAGED: think "broken" → can understand but speech is disjointed :(

② MOTOR AREA
AKA Primary motor cortex → control voluntary movement



PARIETAL

THINK "PIRANHA" → the piranha is biting the parietal lobe which is extremely sensitive

{ sensations – "piranha"
- perception → body awareness
- attention
- calculations

MAIN FUNCTION:
① SENSORY AREA
processes sensory information!!!
> temp
> pressure / touch
> smell, pain, taste

OCCIPITAL

THINK: OPTIC
> visual system
> visual information
- Process visuals
- Process perception of shapes and sizes

TEMPORAL

THINK: "TEMPO"
- hearing + attention
- storing verbal and visual memories
  { short term + long term memory
- helps with SOME balance
  THINK: your ear has hearing and balance characteristics
- understanding language / speech

IMPORTANT PART:
① WERNICKE'S AREA – Receptive speech
- controls language comprehension

{ IF DAMAGED: "wernike is crappy"
→ unable to UNDERSTAND + RESPOND to what people are saying

"FINE TUNE OUR MOVEMENT"

EXTRA: CEREBELLUM

AKA MINI BRAIN
- balance, coordination, rhythm
- proprioception
- posture, movement

BRAIN STEM

- consciousness, breathing, HR

SCHIZOPHRENIA

WHAT IS IT? Long-term inability to tell what is **REAL** and **NOT REAL** → Affects how a person **thinks, feels** or **behaves**

ONSET: Mostly in **late teens – early 20's** (may appear in late onset (>40 yo) too)

CAUSE: **unknown**, but may be influenced by:
- Altered brain chemistry
- Genetics or FHx
- Environmental stress
- Substance Abuse

SIGNS + SYMPTOMS:

(+) SYMPTOMS: Experiencing things that **SHOULDNT** be there
- Hallucinations
- Delusions
- Disorganized Thinking

(−) SYMPTOMS: Lack of symptoms that **SHOULD** be there
- Flat or blunted affect
- Isolation or Apathy
- Anergia or Anhedonia
- Reduced speech

PHYSICAL SYMPTOMS:
- Catatonia (changes in muscle activity)
- catatonic stupor (motionless) or excitatory (restless)

DIAGNOSTIC:
≥2 symptoms (1 of them has to be a (+) symptom) for at least 1 month **AND 6MO** of continual disturbance of physical symptoms

TREATMENT:

① **MEDICATIONS:** **Antipsychotics** (1st Gen or 2nd GEN)

② **ACUTE PHASE:** First episode or a relapse episode → Reduce psychotic thoughts + behaviors
- Antipsychotics or Benzodiazepines

③ **STABLE/MAINTENANCE PHASE:** Prevent relapse, minimize symptoms, family support
- Antipsychotics and teach medication adherance
- stress techniques
- Educate NO drugs or alcohol

⇩ **Get family involved**

(+) SCHIZOPHRENIA SYMPTOMS
NURSING CARE

HALLUCINATIONS:

PRIORITY: SAFETY

- Keep the environment calm to reduce stimuli
- Be direct with questions → What are you hearing? seeing? What are the voices saying?
- Validate feelings but **STAY IN REALITY**
- Monitor for worsening stimuli (fear, anxiety)
- Give PRN medications
- Start with **1:1 interaction** → Then move to group settings

DELUSIONS:

PRIORITY: SAFETY

- Ask for details and validate details that are real
- **DO NOT** challange or argue delusions
- Focus on **feelings** and whats real
- Honesty, set **limits and boundaries** to stop fixating on delusions

OTHER:

- **Assess self harm!**
- Assess physical needs
- Be present and organized
- Start small **(1:1)** with small tasks first and no choices
  → Then move to more freedom

REMEMBER:

Hallucination Types:

- AUDITORY
- OLFACTORY
- TACTILE
- VISUAL
- GUSTATORY

Delusion Types:

- GRANDEUR
- PERSECTION
- JEALOUSY

SCHIZOAFFECTIVE DISORDER

WHAT IS IT?

A long-term (chronic) disorder characterized by symptoms of schizophrenia AND symptoms of a mood disorder

TYPES: BIPOLAR TYPE → Depressive episodes + Mania + schizophrenia symptoms

DEPRESSIVE TYPE → Only depressive episodes + schizophrenia symptoms

DIAGNOSTIC:

Rule out drug/alcohol abuse, physical exam to Rule out other problems that may cause symptoms

KEY: Many people are misdiagnosed as only bipolar, only depressed or only schizophrenic

CAUSE: unknown, but may be influenced by:
- Altered brain chemistry
- Genetics or FHX
- Environmental stress
- Substance Abuse

SIGNS + SYMPTOMS:

1. Depression or Bipolar episode
2. Delusions
   Hallucinations
   impaired communication or speech
   impaired occupational or social functioning
   Trouble with ADL's

DEFINING FEATURES:
- Psychotic symptoms for >2WKs without mood SX
- Drugs are not responsible for the symptoms

TREATMENT:

WATCH SUICIDE RISK

- MEDICATIONS: Antipsychotics, Antidepressants, Mood stabilizers
- Cognitive Behavioral Therapy (talk therapy) → Journaling, cognitive restructuring, family therapy, talking out problems
- Teach coping strategies and stress techniques
- Social skills training to improve quality of life

IF OTHERS FAIL → Electroconvulsive therapy (ECT)
- Electric currants pass through the brain to try to reverse symptoms

BIPOLAR DISORDER

WHAT IS IT?

A **mood disorder** characterized by **alternating** episodes of **extreme mania and depression**

MANIC SX:

- MOOD: elevated, irritable, restless
- Flight of ideas
- delusions
- Grandiose
- impulsive, poor judgement
- ↓ attention span, insomnia
- neglect of ADL's

KEY: **many episodes of mania** may require **hospitalization** for safety and stabilization

TYPES:

1. BIPOLAR 1: at least ONE manic episode **alternating** between **depression**
2. BIPOLAR 2: at least ONE or more HYPOMANIC episode (less severe) alternating between **depression**
3. DYSTHYMIA: **mild, long term** depression
4. CYCLOTHYMIA: like bipolar 2 but **less severe in both** mania + depression

DEPRESSIVE SX:

- MOOD: dysphoric, flat affect, crying, despairing
- anergia; anhedonia (lack of pleasure)
- difficulty concentrating/slow thinking
- ↓ appetite, Δ sleep pattern
- SUICIDE RISK

RISK FACTORS:

1. Psycholigic stress → moving, accident, robbery, loss, etc.
2. Neurologic disorders
3. Genetics
4. Substance abuse

SX reduce if:

- ✓ family support is positive
- ✓ communication improves
- ✓ stick to same rhythm

REMEMBER:

- monitor sleep, fluid + food intake
- KEY: ↑calories = ON-THE-GO SNACKS!!
- set limits to grandiose behavior

NURSING CARE + TX:

MOST SUCCESSFUL = medication + psychotherapy

- Anticonvulsants
- Antipsychotics
- Antidepressants
- LITHIUM

1. Provide SAFE ENVIRONMENT
   ↓ stimulation = quiet environment
2. 1 on 1 observation IF RISK to others or themselves
3. Pt may engage in grandiose behavior = giving away money, sexual

MANIC EPISODE

ASSOCIATED WITH BIPOLAR DISORDER

WHAT IS IT? sustained period of abnormally elevated or irritable mood, intense excitement, euphoria, or exaggerated behavior

- Lasts 1 WK and present most of the day
- can be manic OR hypomanic (same symptoms but LESS SEVERE)

SIGNS + SYMPTOMS:

- Easily Distractible; Flight of ideas
- Inflated self-esteem; Grandiosity
- Overtalking, Racing thoughts
- Decreased need for sleep → insomnia
- Increased energy or agitation
- Euphoria
- Increased risky activities → feels invincible!

TREATMENT:

- MOOD STABILIZERS (may be associated with bipolar disorder)
- Avoid triggers → caffeine, alcohol, drug use, stress
- Encourage exercise (to waste energy)
- WATCH SUICIDE RISK → more likely to carry out their plan
  - Ask if they have a plan
- set limits on grandiose behavior
- orient to reality but do not argue → if psychosis is present
- HIGH CALORIE SNACKS!!
  - ↳ these patients are on-the-go!

DEPRESSION

TYPES:

MAJOR DEPRESSION: 5 or more symptoms that occur daily and persistantly for 2 weeks or longer

SEASONAL: occurs due to lack of sunlight in winter months
Treatment: light therapy, self care

DYSTHYMIA (MILD): 3 symptoms at least for more days than not for at least 2 years Typically child onset!!

BIPOLAR: alternating episodes of depression and mania

POSTPARTUM: new mothers → raging hormones and a sense of disconnect

RISKS:

- Family history
- chronic illness
- Negative life event
- substance abuse
- older adults >65
- FEMALES (15-45)
  Think → we're more emotional

SYMPTOMS:

COGNITIVE: negative view of { self, world, future }
crying
thought disruptions
suicidal ideation

MOOD: dysphoric, depressive mood,
↓ pleasure (anhedonia)
difficulty concentration
indecisiveness

PSYCHOMOTOR: agitation, fatigue
↓ appetite, ↑ or ↓ weight
sleep disturbance
excess sleeping

NURSING CARE + TX:

SAFETY: remove harmful objects
1 on 1 observation
{ASSESS SUICIDE RISK}

PHYSICAL NEEDS: assess weight, prevent constipation
hygeine

COMMUNICATION: encourage participation in activities, hobbies, group fun!
- simple sentences
- ↑ time for responses
- promote expression of feelings
- offer support + interest

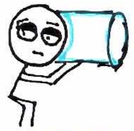
ECT - electroconvulsive therapy

MEDICATION:
- Antidepressants (TCA's, Atypical, SSRI's, SNRI's, MAOI)
  ↓
  last option → many risks

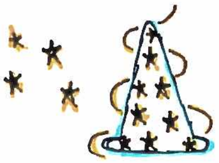
PERSONALITY DISORDERS

CLUSTER A: ODD + ECCENTRIC

PARANOID
- suspicious
- mistrust of others
- on guard / blames others



SCHIZOID
- emotional detachment
- introverted
- lack of interest in social relationships



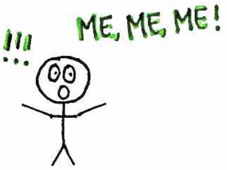
SCHIZOTYPAL
- magical thinking
- perceptual distortions
- eccentric, odd (WILLY WONKA)
- unusual fears

NURSING CARE:
1. Respect isolation → if they arent hurting anyone, theres nothing wrong with it
2. Help client focus + address feelings of delusions (paranoid)
3. Facilitate communication + identify negative thoughts

CLUSTER B: DRAMATIC

ANTISOCIAL
- disregard for law
- **MANIPULATIVE**
- Aggressive
- lack of remorse

BORDERLINE
- SPLITTING (All good or all bad)
- impulsive, self damaging
- Risk for **suicide**

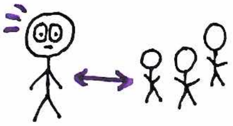


HISTRIONIC
- **attention-seeking**
- over-react for attention
- flirty / seductive
- manipulative

NARCISSISTIC
- arrogant
- lack empathy
- **need constant attention**
- exaggerated sense of self worth

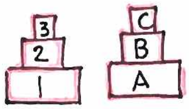
NURSING CARE:
1. **SET LIMITS** and **CONSISTANCY**
2. Provide **safety** for ↑ **risk** of **suicide** (borderline)
3. Be assertive (histrionic)
4. Encourage socialization to improve skills

CLUSTER C: ANXIOUS



AVOIDANT
- **avoid** social situations d/t fear of rejection or abandonment
- lonely, feels unwanted
- wants close relationships but scared

DEPENDANT
- excessive need to be taken care of
- **clingy**, fear of separation
- avoid responsibility



OCD
- desire **perfection**, order and control
- rigid + unbending in their ways
- calm + controlled

NURSING CARE:
1. Be **assertive** (dependant)
2. Provide reassurance, validate concerns (Avoidant)

DISSOCIATIVE IDENTITY DISORDER (D.I.D)

AKA MULTIPLE PERSONALITY DISORDER

WHAT IS IT? when conscious awareness becomes **separated (dissociated)** from memories, thoughts + feelings

- **TWO OR MORE** distinct personalities or identities in **ONE person**
  - **BOTH** personalities influence a person's thoughts or behaviors
  - **EACH** identity has their own mannerisms:
    - → original personality denies existance of the other ones
    - → different emotional responses
    - → some may be Right handed and then left handed

KEY: Many of us play different roles **(Role-playing)** when we are working or with friends → so we **MUST** distinguish from **D.I.D and Role playing**

CAUSE: History of **child abuse** or some other extreme life stressor

- our conscious awareness **"dissociates"** from painful memories

SIGNS + SYMPTOMS:

- **Memory loss** of specific people or events
- out of body experience → watching a **movie** of yourself
- sense of **detachment**, lack of identity
- other mental health problems (anxiety, depression)

TREATMENT:

① **Psychotherapy** → CBT and DBT

② **Medications** → Antidepressants

- watch for **suicide risk**
- Help the patient **make decisions** during dissociative period
- **Grounding technique** → Bring back to reality

TYPES:

1. **Dissociative Amnesia**: lack of memory surrounding traumatic event
2. **Depersonalization or Derealization**: feeling of detachment from your own body or environment

ANXIETY DISORDERS

① GENERAL ANXIETY DISORDER

WHAT: An individual's general state is continuously **tense and uneasy** → will affect daily life

DURATION: must experience symptoms for > 6 MONTHS

CAUSE: **unknown**; hard to identify the cause of distress

› Typically will have a diagnosis of depression

MOSTLY AFFECTS WOMEN

SYMPTOMS:

PSYCHOLOGICAL

- Apprehensive
- persistant worry
- Fear of making wrong decision
- Feeling restless or on edge
- Trouble concentrating

PHYSICAL

- Fatigue
- Twitching, trembling
- sweating
- Trouble sleeping
- Easily startled

② PANIC DISORDER AKA PANIC ATTACK

WHAT: sudden burst of panic and intense fear that may last minutes to hours

DURATION: may last minutes to hours

CAUSE: different triggers specific to the person

- unwarrented → no real danger or apparent cause
- warrented → real reason for panic (burglar)

SYMPTOMS: Heart palpitations, ↑ HR

- sweating, trembling, shaking
- SOB, chest pain
- Nausea, faint, dizzy

MAY BE MISTAKEN FOR HEART ATTACK

PSYCHOLOGICAL:

- walls are closing in
- sense of impending doom
- Fear of loss of control or death

ANXIETY DISORDERS

③ PHOBIAS → FOCUSED ANXIETY

WHAT: overwhelming and unreasonable fear of objects or situations that pose little real danger but provoke anxiety and avoidance

DURATION: Long lasting → can affect ability to function normally depending on severity

* can live fairly normal lives depending on the **FOCUS** of the phobia

1. **SUBTLE** → Animals, blood, heights, enclosed spaces
2. **DEBILITATING** → **SOCIAL PHOBIA**, leaving the house

SYMPTOMS: intense fear or panic

- Feeling powerless
- Avoiding object or situation
- sweating, rapid HR, SOB
- Dizzy, faint, crying

* **MAY PRESENT FROM A NEGATIVE EXPERIENCE**

COMPLICATIONS FOR ALL ANXIETY DISORDERS

- social isolation
- Mood Disorders or depression
- substance abuse

RISK: SUICIDE

CARE FOR ALL ANXIETY DISORDERS

MEDICATIONS: SSRI's, Anxiolytics, Benzodiazepines, Buspirone

NURSING:

- Active listening
- Be present, engaged
- Relaxation techniques
- cognitive behavioral therapy
- Encourage exercise
- Evaluate previous coping mechanisms

IF SEVERE:

- Provide pt a quiet environment
- Remain **WITH** patient
  - set **limits**
  - Help patient focus on reality

OCD

OBSESSIVE-COMPULSIVE DISORDER

WHAT IS IT? Unwanted **repetitive thoughts** (obsessions) and unwanted **repetitive behaviors** (compulsions)

MINOR: checking to see if a door is unlocked or locked and then the worry goes away

SEVERE: persistant repetitions that are hard for the person to ignore and **interfere with daily life**

THEMES:

COMMON OBSESSIONS:
- dirt / toxins
- intense fear something bad will happen
- need for symmetry / order

COMMON COMPULSIONS:
- washing hands so much that they bleed
- checking tasks over and over
- movement ritual (sit/stand, enter/leave room)
- counting

MOSTLY AFFECTS TEENS AND YOUNG ADULTS

COMPLICATIONS:
- excessive **time spent** on ritualistic behavior
- **Dermatitis** → Too much hand washing
- Difficulty attending school or work
- Troubled Relationships
- **SUICIDE RISK**

CARE:
- **cognitive behavioral therapy**
- Exposure response prevention → expose person to the obsession and learn ways to resist behavior
- Antidepressants, Anxiolytics
- **Watch suicide risk**
- set **limits** to OCD behaivor
- Keep stress level **low** and encourage **positive behavior**

PTSD

POST-TRAUMATIC STRESS DISORDER

WHAT IS IT? Lingering **memories or nightmares** of a past event that can greatly interfere with your day-to-day functioning

Examples: soldiers coming home from war
- survivors of a terrible accident
- witness of 9/11
- violent or sexual assaults

SYMPTOMS → GROUPED INTO 4 TYPES

1. **Intrusive** → unwanted memories, flashbacks, dreams
2. **Avoidance** → avoid talking/thinking about event, Avoid places or activities that remind you
3. **Negative thought + mood** → hopelessness, feeling detached, feeling numb, lack of interest in things
4. **Change in physical + emotional reaction** → easily startled or frightened, always on guard, trouble sleeping angry or aggressive, self destructive

CLASSIFIED AS PTSD WHEN SYMPTOMS LAST LONGER THAN 4WKS

CARE:

- cognitive behavioral therapy
- Exposure therapy → safely face memories or situations
- Teach stress management skills
- Antidepressants, Anxiolytics, Prazosin (for nightmares)
- Watch suicide risk

EATING DISORDERS

① ANOREXIA NERVOSA

WHAT? Life threatening eating disorder characterized as **LOW BODY WEIGHT (↓15%)** + Periods of starvation

› classified as underweight: deny themselves food to the point of starvation **AND THEN** will participate in binge eating and purging the food that they DO eat **OR** exercise until exhaustion

RISK FACTORS:
- Family History / influence
- Early 20's
- sociocultural factors (modeling, actress)
- Athletes
- Peer Pressure
- Emotional trauma
- Depression / Anxiety

DIAGNOSE: hard to diagnose because people hide their symptoms

GOAL: EARLY DIAGNOSIS
- Physical Exam + interview
- Lab testing
- Psych evaluation
- Identify co-occuring illness (Depression, anxiety, low self esteem)

SYMPTOMS:

Amenorrhea
No other disease causing weight loss
Obviously thin but feel FAT
Refusal to maintain normal weight
Epigastric discomfort → Purging
X-tra symptoms → thin hair, ↓RBC, irritable
Intense fear of gaining weight + eating in public
Always thinking of food

TREATMENT: INPATIENT OR INTENSIVE OUTPATIENT

- Weight Restoration; Rebalance electrolytes, Rehydrate
  - WATCH REFEEDING SYNDROME
- Psychotherapy → "Talk Therapy"
- Family support + encouragement
- Meds of co-occuring illness
- Monitor weight → watch pocket stuffing and heavy clothing

COMPLICATIONS:

- Amenorrhea, constipation
- Abdominal Pain, dehydration
- Electrolyte imbalance!
- irregular ♡ rhythms, low BP/HR
- cold intolerance!
- Trouble sleeping / fatigue

EATING DISORDERS

② BULIMIA NERVOSA

WHAT? Eating disorder characterized by binging and purging

- Typically **NORMAL WEIGHT** or slightly overweight
- They eat an excessive amount of food in a short amount of time **AND THEN** desperately try to rid themselves of extra calories by vomiting, laxatives or excessive exercise

RISK FACTORS: Family History

- Trauma, depression or anxiety
- Peer Pressure, Bullying, Troubled relationships
- Early 20's, lack of control in life
- sociocultural factors (modeling, actress)

SYMPTOMS:

Binge eating → Followed by going to the bathroom immediately
Uncontrollable strict dieting → avoiding certain foods
Lack of control with eating
Induced vomiting (& exercise)
Minimum of 2 binge episodes
Increased concern of body size
Abuse of laxatives or diuretics

- poor self esteem
- irritable

DIAGNOSE: Binging and purging at least 1 time/week for 3 months

COMPLICATIONS:

PHYSICAL SYMPTOMS:

- fluctuating weight each week
- chapped, cracked lips = Dehydration
- mouth sensitivity → eroding enamel
- Epigastric discomfort
- Electrolyte imbalance!
- cardiac dysrhythmias, heart failure

TREATMENT: INPATIENT OR INTENSIVE OUTPATIENT

- Rebalance electrolytes, Rehydrate
- Psychotherapy → "Talk therapy"
- Nutrition counseling
- Family involvement
- Meds for co-occuring illness
- WATCH for frequent trips to the bathroom!!

EATING DISORDERS

③ BINGE EATING DISORDER

WHAT? Large amount of calories are consumed and no action is taken to try to eliminate the calories

- Feel that eating behavior is out of control

SYMPTOMS:

- Normal weight, overweight OR obese
- loss of control
- Eating large amounts in a small time
- Eating alone or in secret
- Feel embarassed, disgusted, depressed or guilty
- says they will diet but never does
- overeating when uncomfortably full

CAUSE:

- Family history or genetic
- Depression or Anxiety
- History of weight stigma
- Restrictive dieting
- childhood trauma (abuse, neglect, etc.)

COMPLICATIONS:

- OBESITY → Diabetes, heart disease, GERD
- social isolation
- Problem functioning in social situations or at work
- Anxiety, depression

TREATMENT:

- Reinforce a healthy body image and size
- Psychotherapy → CBT, interpersonal, dialectical
- Medications: Topiramate → anticonvulsant that reduces binge eating
  Antidepressants → reduce binge eating
- Weight loss programs
- Family support + involvement

SUBSTANCE ABUSE AND ADDICTION

SUBSTANCE ABUSE

- Use of a substance occurs **OUTSIDE** of a medical necessity or **OUTSIDE** of social acceptance
- **DO NOT** have physical dependence
- May cause physical harm to self or others → **DUI'S**
- Risk of **overdose**

SUBSTANCE ADDICTION

- Use of a substance **SO OFTEN** that **TOLERANCE** develops
- Person has to take **more** of the drug to stay "normal"
- Has **physical dependence**
- control over substance is **LOST**
- Risk of overdose, **WITHDRAWAL AND DEATH**

4 C's OF ADDICTION

- compulsive behavior
- cravings
- control (lack of)
- consequences → still engage in behavior even when negative consequences occur

SUBSTANCE TYPES:

Alcohol	Opioids
Caffeine	sedatives
cannabis	Hypnotics
Hallucinogens	Tobacco
inhalants	Prescription drugs

CAUSES + RISKS

- **ENVIRONMENTAL**: family beliefs and attitude towards drug
- **GENETICS**: Family history of addicts
  - → **Early exposure** (brain is developing)
- Highly addictive substance or **prescription drugs**
- social situations / peer pressure
- **recieving meds** from friends / family

NOTE: SYMPTOMS OF EVERY SINGLE SUBSTANCE TYPE WILL VARY!

SIGNS OF ADDICTION:

- Feeling you need to use the drug regularly
- intense **urges** to block out other emotions
- **Needing more** to gain effect OR taking larger amounts than you intended
- spending money on substances even though you **cant afford it**
- Trouble with personal and social relationships
- stealing, DUI, HIV (needles)
- **Withdrawal symptoms**

SUBSTANCE ABUSE AND ADDICTION

COMPLICATIONS:

- Will have **short term** and **longterm** effects
- Many will cause Dehydration + electrolyte imbalance
- Methamphetamine, opioids + cocaine → highly addictive and can cause psychotic behavior, seizures and death in overdose
- Inhalants → brain damage
- Date rape drugs (GHB) → loss of recollection, seizures, coma
- Risk of drugs being laced with other drugs
- HIV → needle sharing, Accidents, suicide
- **OVERDOSE = RISK OF DEATH**

NURSING CARE:

TREATMENT PROGRAMS:

- inpatient vs outpatient
- individual vs group therapy

TEACH:

- Relaxation techniques, guided imagery and **coping** strategies
- **Psychotherapy** → Behavior therapy
  Performed by a psychologist or psychiatrist to address other mental health conditions and ways to cope
- **self-help groups**: AA or NA

CARE:

- Assess **self harm** potential; use restraints only if a harm to self or others
- Assess for signs of **overdose** (↓LOC, ↓RR, ↓HR) and **withdrawal** (irritable, confusion, seizure sx)
- Explore patient **interest** in taking action
- Therapeutic communication → caring, nonjudgemental
- Quiet, relaxed environment

DETOXIFICATION:

- Recommended that a patient is **monitored** during detox
  WHY? RISK OF SEIZURE OR DEATH
- Different drugs will produce different detox side effects
- **WITHDRAWAL OCCURS WITHIN A FEW HOURS OF LAST DRINK → PEAKS AT 24-48 HOURS** (watch for seizures)
  ↳ Give anticonvulsants as prophylactic for seizures!

ALCOHOL ADDICTION TREATMENT

MEDICATIONS

- **NALTREXONE** → REDUCES OR ELIMINATES ALCOHOL CRAVING
- **ACAMPROSATE** → HELPS PATIENT ABSTAIN FROM ALCOHOL
- **TOPIRAMATE** → DECREASE ALCOHOL CRAVINGS
- **DISULFIRAM** → REACTION WITH ALCOHOL CAUSES UNPLEASANT PHYSICAL EFFECTS
- **NALTREXONE** → HELP REDUCE ALCOHOL CRAVING

ALCOHOL WITHDRAWAL MEDICATIONS

RISK OF SEIZURES

seizures **MAY** occur **24-48 hours** after last drink

→ we want to stay prepared for this risk by giving:

- BENZODIAZEPINES
- ANTICONVULSANTS
- BETA BLOCKERS
- MAGNESIUM SULFATE
- THIAMINE (B1), FOLIC ACID

WITHDRAWAL SYMPTOMS: (as early as 6 hours) tremors, vomiting, anxiety, irritability high blood pressure, ↑HR, confusion

SEIZURE SYMPTOMS: extreme confusion + agitation, ↑HR, fever, sweating, LOC, aura, headache

MENTAL HEALTH IN CHILDREN

① INTELLECTUAL DISABILITY

SEVERITY: can be **mild**, **moderate**, **severe** or **profound**

CAUSE: Fetal alcohol syndrome, genetic or chromosomal conditions, fetal infections, hypoxia, prematurity, trauma

TYPES:
- **Fragile X syndrome**
- **Down syndrome**
- Tay Sachs or Prader Willi
- Developmental Delay
- Fetal Alcohol Spectrum Disorder

SYMPTOMS: Deficits in reasoning, problem solving, judgement, planning
› Trouble with academic learning, communication, personal independence

② AUTISM SPECTRUM DISORDER

SEVERITY: High-functioning Autism, Autism, Severe Autism

DIAGNOSE: **2 or more** of the following:
› **Stereotyped** or repetitive speech, motor movements or use of objects
› Excessive adherance to routines or rituals
› **Fixated interents** in unusual objects
› Hyporeactive or hyperreactive to senses **(Joy)** or to sensory aspects of the environment
› Deficits in communicative behavior and emotional reciprocity
› Resistance to change

③ TOURETTE SYNDROME

Rapid, involuntary, reoccurring motor movements with **at least one vocal tic** (vocal tics may wax and wane)

Example: excessive blinking, facial grimacing, shoulder shrugging head turning → may significantly impact social and occupational functioning

DUE TO: stress, excitement, fatigue, anxiety

LIFE LONG WITH PERIODS OF REMISSION

MENTAL HEALTH IN CHILDREN

④ ADHD

ONSET: Presents itself before age 7

DIAGNOSE: Typically diagnose when the child has difficulty adjusting to elementary school

SYMPTOMS: Hyperactivity
Inattention
Impulsiveness

As the child ages, symptoms become LESS pronounced

CAUSE: unknown but risk factors include family history, large chaotic family, intrauterine exposure to drugs, alcohol or nicotine and parental rejection

⑤ CONDUCT DISORDER

ONSET: Ages 6-10

SYMPTOMS: Aggressive behavior (cruelty to animals, fighting and bullying)
- stealing
- poor peer relationships
- little concern for others
- lacks guilt and remorse

IN ADOLESCENCE: high risk for criminal behavior and substance abuse in adulthood

COMMUNICATING WITH CHILDREN

BARRIERS TO TREATMENT

- lack of clarity about why when and how to screen
- lack of resources (medications, healthcare)
- lack of Mental Health Providers
- unclear communation between a therapist and client
- Fear, lack of education

ASSESSMENT:

Mental status assessment is similar to adults **BUT** we must consider developmental level too

- Developmental Assessment → give info on maturation level compared to chronological age
- critical in developing plan of care and a high quality early childhood program

NOTE ANY DEFICITS

COLLECTING DATA: INTERVIEW, INTERACT, OBSERVE

- use games, drawings, puppets or freeplay to facilitate interaction
- convey acceptance → establish trusting relationship
- collect data from child and caregiver
- identify negative behavior and teach child to stop using it
- Get down to child's level
- Ask questions about life at home or school
- Teach child to express feelings of anger appropriately
- observe interactions from child to caregiver and from child to child

DEMENTIA

WHAT? **Gradual change** in mental state that occurs over the course of **months** to **years** and interferes with daily life

ONSET: months to years
ATTENTION: in early stages → **ALERT**
FLUCTUATION: **NO, ITS STEADY**
AGE: most common >65 → Dementia is **NOT** a normal part of aging

- Many types are **IRREVERSIBLE**
- Few are **REVERSIBLE**

DEMENTIA IS NOT A SPECIFIC DISEASE, BUT SEVERAL DISEASES WILL DAMAGE THE NERVE CELLS AND CAUSE DEMENTIA SYMPTOMS:

NONREVERSIBLE:

1. **Alzheimers Disease:** MOST COMMON (60-80%)
   CAUSE: Damage to healthy neurons and fibers due to plaques (clumps of protein) and tangles (protein)
2. **Vascular Dementia:** 2ND MOST COMMON
   CAUSE: lack of blood flow to the brain = lack of oxygen = neurons die off EX: STROKE
   specific sx include problem solving, slowed thinking + focus
3. **Lewy body dementia:** lewy bodies are abnormal protein structures in the brain that accumulate and damage nerve cells
   - specific sx include visual hallucinations, acting out dreams during sleep and problems with focus
4. **Frontotemporal Dementia:** breakdown of nerve cells in the frontal and temporal lobes → areas involved in personality, behavior and judgement
5. **OTHER:** Parkinson Disease Dementia
   Huntington Disease

DEMENTIA

REVERSIBLE causes of dementia:

- **D**rugs
- **E**ndocrine disorders (hypothyroidism)
- **M**etabolic disorders (Addisons, Cushing)
- **E**motional disorders
- **N**utritional deficiency → B12, B6
- **T**umors, toxins
- **I**njury (Traumatic Brain Injury)
- **A**lcohol abuse

DIAGNOSIS:

- Extremely hard
- Patient history from patient and family
- Observe patient emotional state (BUT patient may be unaware)
- Rule out underlying health issues
- Neurologic evaluation
  - Cognitive Test: Mini mental status exam OR mini-cog
  - Brain scan (CT/MRI)

SYMPTOMS: VARY DEPENDING ON CAUSE

COGNITIVE

- Memory loss
- Trouble communicating or finding words
- Trouble with coordination + motor function
- Confusion, disorientation
- Trouble planning and organizing

PSYCHOLOGICAL

- Personality changes
- Depression, anxiety
- Inappropriate behavior
- Paranoia, Hallucinations
- Agitation

TREATMENT: MOST TYPES CANT BE CURED, BUT WE CAN:

- Keep the mind active with mentally stimulating activities
- Keep the patient socially active and simplify tasks
- No smoking/alcohol, healthy diet
- Reduce environmental stimuli (clutter + noise)

MEDICATIONS:

1. Cholinesterase inhibitors → ↑ACh → Boost memory and judgement
2. Memantine → improve glutamate action
3. Sleep aid, meds for hallucinations or agitation

ALZHEIMERS DISEASE

MOST COMMON FORM OF DEMENTIA IN OLDER PEOPLE

- PROGRESSIVE, IRREVERSIBLE
- PROGRESSION OF DISEASE OCCURS IN STAGES:

STAGE 1: No Dementia, No cognitive decline
- No impairment; others dont notice impairment

STAGE 2: No Dementia, very MILD cognitive decline
- very subtle and considered normal for aging
- Normal Forgetfullness (forget a word or event)

STAGE 3: No dementia, MILD cognitive decline
- Increasing forgetfulness; may get lost more often
- slight difficulty concentrating, planning, organizing
- Try to hide their difficulties

STAGE 4: Early stage, MODERATE cognitive decline
- Trouble with finances, traveling alone
- Trouble remembering recent events
- in denial of symptoms; withdraw from family

STAGE 5: Mid stage, MODERATELY SEVERE cognitive decline
- Trouble with address or phone number, time of day
- Memory loss of major, relevant events
- Assistance needed for daily activities

STAGE 6: Mid stage, SEVERE cognitive decline (MIDDLE DEMENTIA)
- Extensive assistance with ADL's
- Forget names of family members
- Incontinence, trouble with awareness

STAGE 7: Late stage, VERY SEVERE cognitive decline (LATE DEMENTIA)
- No ability to speak or communicate
- serious decline in ADL's, movement → maximum help
- loss of psychomotor skills

DELIRIUM

WHAT? Acute/sudden change in mental state that occurs in a matter of hours to days

- Temporary or reversible
- Affects Attention
  Memory
  cognition
  consciousness

ONSET: hours to days
ATTENTION: Trouble focusing
FLUCTUATION: YES
AGE: worse with age!
- **WHY?** Acetylcholine decreases with age
  Acetylcholine is reduced with stress
  → Higher risk of further drop in Ach.
  AND Troubling filtering toxins in blood = more toxins in brain

CAUSE:
Disruption in normal sending or recieving of brain signals (Ach, dopamine, GABA) due to: Advanced age
- UTI
- cognitive decline
- surgical stress
- Polypharmacy
- dehydration
- Alcohol intoxication or withdrawl
- Acute illness (Pneumona)

SIGNS + SYMPTOMS:
FLUCTUATE THROUGHOUT THE DAY
- Trouble staying focused on one topic
- Easily distracted OR withdrawn (little response)
- Poor memory, Disorientation
- Hallucinations OR Restless and agitated behavior
- Extreme emotions → fear, anxiety, irritable
- Disturbed sleep habits

TREATMENT:
GOAL → Treat the underlying cause

INFECTION (Ex: UTI) → Antibiotics
DEHYDRATION → Fluids and electrolytes
DRUGS → Remove drugs ü

TEACH: Relaxation Techniques
Remember: Adequate lighting!

OTHER CARE:
- orient patient to your surroundings → Remind patient of location
- involve familiar faces (family) and stimulating activities
- Reduce noise and sleep interruptions
- Proper nutrition and fluids

RESTRAINTS

REMEMBER: There must be a physician order (reviewed + reordered q24h)
Restraints are time limited (ex: 2hr, 4hr)
Alternative approaches should always be tried first
ongoing observation and assessment (Ex: q15min)

AUTHORIZED IF:

- Behaviors are physically harmful to the patient or others
- Alternative measures are insufficient in protecting the patient

IN EMERGENCY:

The nurse may place the patient in restraints but must first obtain a written or verbal order

- Telephone order is acceptable → must be followed by a written order with physician follow up
- Document behavior leading to restraint
- Assess at every 15-30min intervals for physical needs, safety and comfort → DOCUMENT

PHYSICAL

- Straps, Vests
- Mitts or finger restraints
- Elbow restraits
- Limb restraints (wrist)
- Belt (around waist)
- vest
- side rails (only if used to prevent a patient from getting out of bed) → Ex: Raising all (3+) siderails

If you are using side rails to prevent a patient from rolling out of bed (seizing, post-op), THIS IS NOT A RESTRAINT

CHEMICAL

- Any type of drug (usually a sedative or antipsychotic) to control a patients violent behavior that could cause harm

ANTIPSYCHOTICS

KEY: For all psychiatric conditions:

DOPAMINE (Think "DOP")
- **D:** Determination for a reward
- **O:** Obsession (addicting)
- **P:** Pleasure

NOREPINEPHRINE (Think "NOR")
- **N:** No hesitation ↑HR ↑BP
- **O:** On Alert
- **R:** Recall is good!

SEROTONIN (Think "SER")
- **S:** sleep
- **E:** emotion
- **R:** Remember (good memory)

(+) SCHIZOPHRENIA SX: experiencing things you **SHOULDNT** be (Hallucinations, Delusions, Disorganized Thinking)

(−) SCHIZOPHRENIA SX: lack of characteristics that **SHOULD** be there (Flat/blunt affect, isolation, lack of interest, ↓ speech)

① FIRST GENERATION (AKA TYPICAL/CONVENTIONAL)

SUFFIX: −ZINE + HALOPERIDOL (Haldol)

ACTION: Block D2 receptors on All Pathways of the brain

USE: (+) schizophrenia symptoms

SIDE EFFECTS:

1.) **Extrapyramidal symptoms:** Parkinsons-like sx, dystonia, shuffling gait. tardive dyskinesia
KEY: GIVE BENZTROPINE

2.) **Neuroleptic Malignant syndrome:** High Fever, variable BP, ↑HR, muscle rigidity, confusion
KEY: GIVE MUSCLE RELAXANT

3.) Anticholinergic sx, orthostatic hypotension, seizures

② SECOND GENERATION (AKA ATYPICAL) more current

SUFFIX: −APINE, −DONE

ACTION: Block D2 **AND** serotonin receptors (level out amount of dopamine)

USE: (+) **AND** (−) symptoms of schizophrenia

SIDE EFFECTS:

1. **Metabolic symptoms:** hyperglycemia (Diabetes), ↑ weight, ↑ cholesterol
2. Anticholinergic sx, decreased libido, sedation, orthostatic hypotension

KEY: Clozapine → **AGRANULOCYTOSIS** (watch: immunosuppression)
Risperidone → can be injected q2wks via IM route

ANTIDEPRESSANTS

KEY: Take 2-4 WKS to take full effect
THINK: 4 letters in "SSRI" → 4 WKS
› RISK FOR SUICIDE

① SSRI's (SELECTIVE SEROTONIN REUPTAKE INHIBITORS)

ACTION: inhibit the reuptake of serotonin back into the neuron → more serotonin floating around in the brain → improve mood

SIDE EFFECTS: weight gain, insomnia, sexual dysfunction

RISK: serotonin syndrome → Agitation, hallucinations, fever, tremors, sweaty

SUFFIX: -TINE, -LINE, -PRAM

② SNRI's (SEROTONIN-NOREPINEPHRINE REUPTAKE INHIBITORS)

ACTION: inhibit the reuptake of serotonin AND norepinephrine into the neuron → more floating in the brain

SIDE EFFECTS: loss of appetite, insomnia, sexual dysfunction

③ TCA's (TRICYCLIC ANTIDEPRESSANTS) -TRYPTLINE -IPRAMINE

ACTION: TRI = 3 actions →
1. inhibit serotonin reuptake
2. inhibit norepinephrin reuptake
3. inhibit Alpha receptors → orthostatic hypotension
   Histamine → sedation
   Muscarinic receptors → anticholinergic sx

USE: depression, anxiety, insomnia, fibromyalgia

SIDE EFFECTS: All of these ↗ + urinary retention

KEY: Be careful in the sun ("cycle") → ↑ fiber / ↑ fluids

④ MAOI's (MONOAMINE OXIDASE INHIBITORS)

Ex: Phenelzine, Isocarboxazid

ACTION: Blocks the destruction of serotonin, norepinephrine, dopamine and TYRAMINE → increase ALL of these in the brain

USE: Depression, panic disorder

SIDE EFFECTS: Agitation, anxiety, ↓BP, HYPERTENSIVE CRISIS (interacts with many meds) DO NOT EAT TYRAMINE FOODS!! (chocolate, avo, wine, cheese)

⑤ ATYPICALS

A. **Buproprion** (wellbutrin) → for depression + smoking cessation
B. **Trazadone** → for depression (high dose) + insomnia

ANTIANXIETY MEDS

① BENZODIAZEPINES (-PAM, -LAM)

ACTION: Bind to GABA receptors to enhance the action of GABA

GABA: Neurotransmitter that slows (calms) the speed of brain activity

SIDE EFFECTS: sedation, ↓RR, ↓BP, ↓HR, amnesia

KEY: FAST ACTING (Think: Pam is riding in a Benz, which is fast)
↓
short term use only! can cause **DEPENDENCY**

Antidote: Flumazenil

② SSRI's (SELECTIVE SEROTONIN REUPTAKE INHIBITORS)

ACTION: see Antidepressants

USE: Anxiety, depression, PTSD, OCD

SIDE EFFECTS: weight gain, insomnia, sexual dysfunction

(Think: Teens (-tine) have a lot of anxiety)

4WKS for full effect!

KEY: Do not take with St. Johns wort

SUFFIX: -TINE, -LINE, -PRAM

③ ATYPICALS - BUSPIRONE

USE: Anxiety, PTSD, OCD, Panic

1-2WKS for full effect!

SIDE EFFECTS: Dizzy, headache, nausea

KEY: Does **NOT** cause sedation **OR** dependency!
Take with **food** if GI upset

④ OTHERS:

TRICYCLIC ANTIDEPRESSANTS
BETA BLOCKERS
BARBITUATES (-barbital) = stays in system for **3-5 days**

MOOD STABILIZERS

USE: For the treatment of BIPOLAR DISORDER

① LITHIUM

ACTION: Helps reduce severity and frequency of manic episodes
- unknown how it does this (may inhibit MOA → ↑ activity of the brain)

SIDE EFFECTS: **LEUKOCYTOSIS!**
increased urination / thirsty
tremors, hypothyroidism
nausea, fatigue

- **Similar to SALT → DO NOT** cut out salt from your diet (↑ **RISK TOXICITY**)
  - **THERAPEUTIC RANGE:** 0.6-1.2 mEq/L
    - **Weekly** blood draws until levels are steady → then 3mo intervals
    - **Monitor for salt loss** → Fever, sweating, diarrhea
- **Teratogenic**
- **1-3 WKS** for full effect

② ANTICONVULSANTS

- Valproic Acid → Acute mania attack preferred over lithium due to **less side effects**
- carbamezepine → **Agranulocytosis**
- lamotrigine

③ ANTIPSYCHOTICS

- Olanzapine
- Risperidone
- Aripiprazole

④ BENZODIAZEPINES (-PAM, -LAM)

ANTIPARKINSON MEDS

REMEMBER: Patients have either **TOO LITTLE** Dopamine or **TOO MUCH** Acyticholine

Characteristics: Pin Rolling Tremors
- Blank expression
- Stooped Posture
- Shuffling gait
- Muscle Rigidity
- Possible mental deterioration

① ANTICHOLINERGIC AGENTS (BENZTROPINE)

ACTION: Atagonizes Acetylcholine and histamine receptors → ↓ Ach

USE: Decrease muscle rigidity and tremors

SIDE EFFECTS: Anticholinergic symptoms: Dry mouth, dry eyes, blurry vision urinary retention, constipation

TEACH: chew gum (dry mouth)
wear sunglasses, ↑ fiber, ↑ fluid

KEY: Do **not** give to a patient with glaucoma; **No alcohol; Dont stop abruptly**

② MAO-B INHIBITORS (RASAGILINE aka AZILECT)

ACTION: Increase dopamine by inhibiting MAO activity

USE: improve shaking + stiffness, Decrease amount of offtime (periods of slow movement)

SIDE EFFECTS: Dizzy, drowsy, nausea, heartburn, dry mouth

KEY: **Avoid foods with Tyramine!** → cheese, chocolate, wine, avo, beer

③ COMT INHIBITORS (-CAPONE)

ACTION: Decrease wearing off of carbidopa / levodopa by blocking COMT enzyme

USE: With carbidopa / levodopa (slows breakdown of levodopa)

④ DOPAMINE AGONISTS:

CARBIDOPA / LEVODOPA → decrease muscle rigidity and tremors

ACTION: Increase Dopamine → carbidopa prevents levodopa from being converted into Dopamine in the bloodstream → ↑ Dopamine entering the brain

SIDE EFFECTS: N/V, drowsy, dyskinesia, Dark urine / sweat, ↓ BP

KEY: May take **~3WKS** to be effective, **↑ protein = ↓ effectiveness**

NO MAOI'S

ROPINIROLE (AKA REQUIP) → improve tremors, muscle spasm, stiffness

May also be used for Restless leg syndrome

SIDE EFFECTS: Drowsy, confusion, orthostatic Hypotension → **FALL RISK**

ADHD MEDS

① METHYLPHENIDATE (RITALIN)

- short Acting

② AMPHETAMINE (ADDERALL)

- short Acting: onset 30-45min
  wear off 3-6HRS
- long Acting: ("XR" = extended release)
  onset 45-1HR
  wear off 8-12HRS
- KEY: Do not take at night - insomnia
  Take immediately before/after a meal
  Monitor weight

SIDE EFFECTS:
- weight loss
- decreased appetite
- insomnia
- dysrhythmias
- moody/irritable

WITHDRAWAL MEDS

① ALCOHOL → as early as 6 hours

KNOW TIME OF LAST DRINK!

PEAK: 24-48 HRS

A. Benzodiazepines: ↓ withdrawal, ↓ Risk seizures, stabilize vitals
B. Anticonvulsants: ↓ Risk seizures
C. Antihypertensives (clonodine) + Beta Blocker: ↓ HR, ↓ BP, ↓ craving

② OPIOID

A. Methadone (long term maintence)

③ NICOTINE

A. Buproprion
B. Nicotine Replacement
C. Varenicline

④ ABSTINENCE - supress patient craving

A. Disulfiram
B. Naltrexone
C. Acamprosate → ↓ anxiety/Restlessness
"A camp makes you happy"

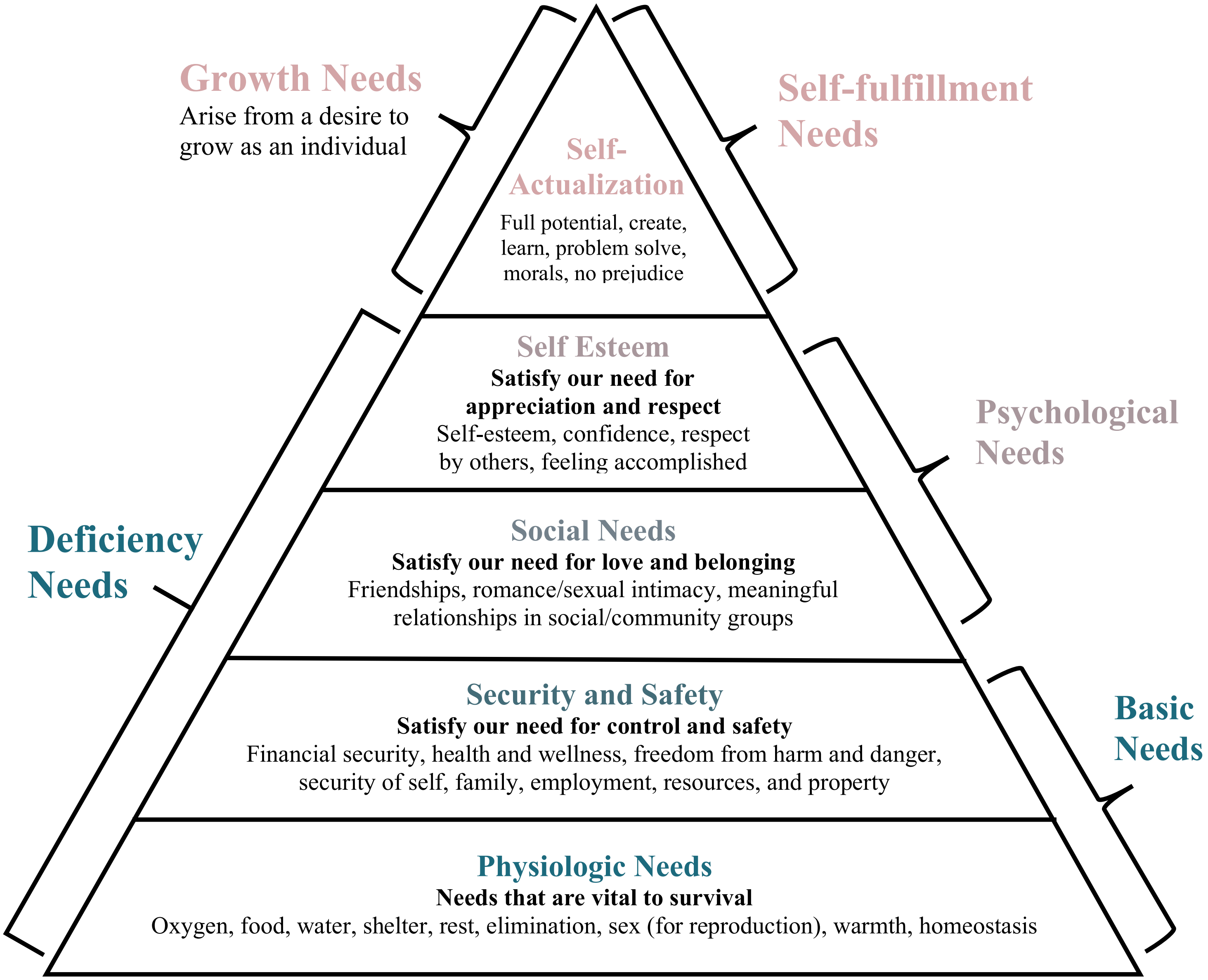
BAD with alcohol:
- N/V, sweating
- Palpitations

ERIKSON'S STAGES OF DEVELOPMENT

Age	Basic Conflict	Important Events	Outcome (Favorable and Unfavorable)
Infancy: Birth – 18 months	Trust vs Mistrust	Feeding	**Favorable:** Children develop a sense of faith in the environment and to caregivers love and affection **Unfavorable:** Suspicion and fear of people/events
Early Childhood: 2 – 3 years	Autonomy vs Shame and Doubt	Toilet Training	**Favorable:** Children develop personal control over behavior and actions. Child feels adequate and independent **Unfavorable:** Feelings of shame and self-doubt
Preschool: 3 – 5 years	Initiative vs Guilt	Exploring	**Favorable:** Ability of the child to take initiative and be assertive. Leads to a sense of purpose **Unfavorable:** Feeling guilty and inadequate
School Age: 6 – 11 years	Industry vs Inferiority	Attending School	**Favorable:** Ability to learn and grow socially/academically (feeling competent) **Unfavorable:** Feeling inferior
Adolescence: 12 – 18 years old	Identity vs Role Confusion	Social Relationships	**Favorable:** Ability to see one's self as unique. Develop a sense of personal identity while staying true to yourself **Unfavorable:** Feeling lonely, isolated and confused
Early Adolescence: 19 – 25 years old	Intimacy vs Isolation	Intimate Relationships	**Favorable:** Ability to make commitments to others and to love **Unfavorable:** Inability to form affectionate relationship
Adulthood: 26 – 64 years old	Generativity vs Stagnation	Family and Occupation	**Favorable:** Caring for others and creating/accomplishing things that make the world a better place **Unfavorable:** disconnected or uninvolved with community or society
Old Age: 65+ years old	Integrity vs Despair	Facing Death	**Favorable:** A sense of integrity, reflection on life, acceptance of life and death **Unfavorable:** Dissatisfaction with life or moments of life; despair over death

MASLOW'S HEIRARCHY OF NEEDS

A tiered system that organizes your needs as a human being, ranging from physiological needs to achieving one's full potential. As humans, our actions are motivated in order to achieve certain needs. Our basic needs are at the bottom tier and where we should begin as the nurse deciding plan of care for our patients. Higher needs can't be satisfied until lower needs are met.



THE ART OF DE-ESCALATION

It's in the nurse's *best* interest to learn how to de-escalate a situation when communicating and interacting with patients. Use the "DEFUSE" method!

D

DECIDE

Decide if a patient is appropriate for verbal de-escalation

- Is the patient responsive?
- Is the patient engaged in conversation?
- Is the patient an active threat to self or others?

E

ENSURE SAFETY

Ensure adequate backup for potential unsafe situations

- Is the area clear of potential weapons (loose objects, supplies?
- Respect personal space → 2 arm's length between you and the patient

F

FORM RELATIONSHIP

Introduce yourself by name and title to establish rapport

- "What would you like to be called?"
- "Will you allow us to help you?"
- Use short, simple sentences

U

UTILIZE INTERESTS

Identify the patient's wants and feelings

- Agree as much as possible, but establish limits and boundaries
- Reinforce that you are not here to harm the patient

S

SET LIMITS

Speak about consequences of bad behavior

- Offer choices for all behaviors – small and big
- Use repetition as needed until you are heard by the patient

E

ENFORCE/EVALUATE

Withdraw and seek additional help if aggression escalates

- Once a situation is defused, debrief with staff members and patient

MENTAL HEALTH TERMINOLOGY

A

Abstract thinking – understanding concepts that are real but are not directly tied to physical objects

Example: freedom, vulnerability, humor

Against Medical Advice (AMA) – a patient chooses to leave the hospital before the treating physician recommends discharge

Agnosia – inability to interpret visual, auditory or tactile sensations

Example: not being able to remember what a doorbell sounds like

Akathisia –feelings of restlessness, muscle twitching and inability to sit still

Key: may be a side effect of antipsychotic or antidepressant medication

Anergia – lack of energy

Anhedonia – inability to experience pleasure

Alogia – decrease speech productivity; a person may provide extensive verbal communication with little useful information

Key: seen in Schizophrenia patients

Apathy – lack of interest, enthusiasm or concern

Affect – outward expression of a person's internal emotional state

B

Blunt affect – difficulty expressing emotions characterized by diminished facial expressions, verbal expressions and gestures

C

Catatonia – increase or decrease in the rate of movement; may involve repetitive activity or stuporous activity where the patient makes little movements at all

Key: think of a cat who stands extremely still and stares

Catalepsy – rigid body posture; very similar to waxy flexibility

Clang association – meaningless rhyming of words

Co-dependence – coping mechanism that involves a lack of caring for one's self; dependent on another person

Cognitive Behavioral Therapy (CBT) – a form of psychotherapy that helps a person become aware of inaccurate or negative thinking so they can view challenging situations clearer and respond positively

Concrete thinking – thinking that is focused on the physical world and is based on facts in the "here and now," physical objects and concrete definitions; opposite of abstract thinking

Conditional release – method of release from incarceration that is contingent upon obeying conditions of release under threat of revocation (return to prison)

Congruent/incongruent with mood – consistency or inconsistency between a person's emotional state and the present situation

Compulsion – irresistible impulse to perform an act

Counter-transference – unconscious attitudes that a therapist or nurse develops towards a client in response to a client's behavior

Example: patient reminds the nurse of someone in his/her life

D

Delusion – false belief or opinion despite sound evidence

Example: grandiose, persecutory, somatic, jealous

Denial – refusing to acknowledge certain thoughts, feelings, or impulses because they are painful or intolerable

Depersonalization – periods of feeling disconnected or detached from one's body and thoughts

Example: watching yourself in a movie or dream

Derealization – periods of feeling detached from one's surroundings; people and objects around you may seem unreal

Example: familiar objects appear strange and unfamiliar

Derailment –jumping from one idea to another with increasingly more fragmented connections between thoughts; also known as *looseness of associations*

Displacement – shifting emotions, ideas, or impulses form their original source to a less threatening source

Example: A man has a bad day at work, comes home and yells at his wife and children

Dissociation – defense mechanism that allows a person to disconnect from thoughts, feelings, memories, and surroundings

Dystonia – continuous muscle spasms and muscle contractions

E

Echolalia – mimicry; repeating words or noises spoken by another person

Example: Parent: "Do you want a cookie?" Child: "Cookie"

Echopraxia – mimicry; imitating the movements of another person

Electroconvulsive Therapy (ECT) – treatment method where controlled levels of electricity are directed into specific areas of the brain to elicit changes in brain chemistry and reverse symptoms of certain mental health conditions

Executive functioning – function of the frontal lobe; regulation and control of cognitive processes, including memory, reasoning, flexibility, problem solving, planning and execution

Key: think of the job description for an Executive at a business firm

Extrapyramidal symptoms – drug induced movement disorders of first generation antipsychotics

Example: acute dystonia, akathisia, pseudo parkinsonism, tremor, tardive dyskinesia (serious adverse effect)

F

Flat affect – severe reduction in emotional expressiveness; nearly no emotional expression

Flight of ideas – a type of derailment characterized by continuous, rapid speech with abrupt changes from topic to topic

Hallucination – sensory experiences that appear real but created in your mind

Example: visual, auditory, olfactory, gustatory, tactile

H

Hypomania – elevated mood with symptoms *less* severe than those of mania

I

Involuntary admission – a civil proceeding in which a patient is hospitalized in psychiatric facilities *against* their will
Implied consent – consent which is not expressly granted by a person, but rather implicitly granted by a person's actions and the facts and circumstances of a particular situation

Example: a clinician approaches the patient with medication in hand and the patient indicates a willingness to receive the medication → implied consent has occurred

L

Limbic system – a part of the brain that deals with emotions and memory; controls responses to stimuli by eliciting fear, anxiety, anger, aggression, love, joy, hope, defense etc. Also known as the "emotional brain"
Looseness of associations –jumping from one idea to another with increasingly more fragmented connections between thoughts; also known as *derailment*

M

Mania – an unstable, elevated mood marked by periods of great excitement, euphoria, intense energy and overactivity
Milieu – a person's environment; the goal as the nurse is to provide an appropriate milieu for the patient to encourage healthier ways of thinking and a safe environment
Mood lability – frequent or intense mood changes or shifts

N

Neurogenesis – production and formation of new neurons in the brain
Neurologic Malignant Syndrome – potentially lethal side effect of antipsychotic medications expressed by high fever and rigidity

P

Projection – shifting emotions, actions or thoughts onto another person in an attempt to avoid feelings of guilt, shame or regret

Example: you are cheating on your spouse, but you accuse your spouse of cheating on you

Psychosis – a serious mental disorder characterized by impaired thinking and emotions that indicate a person has lost contact with reality

R

Rationalization – defense mechanism where an individual justifies ideas, actions, or feelings with explanations
Regression – reverting to an earlier pattern of behavior

Repression – defense mechanism that protects you from impulses or ideas that typically cause anxiety by preventing them from becoming conscious

S

Sublimation – defense mechanism where unacceptable urges are transformed into more productive and acceptable behavior
Suppression – consciously hiding unwanted ideas, fears, or impulses from the mind
Splitting – defense mechanism where a person's mind splits between good and bad, black and white, all or nothing; failure to bring together both positive and negative qualities of one's self or others

T

Tangentiality – speaking about topics that are unrelated to the main topic of discussion
Tardive Dyskinesia – serious adverse effect of psychotic medications characterized by involuntary movements of the tongue, lips, face, trunk, and extremities
Transference – projecting irrational feelings and attitudes from the past onto people in the present

Example: patient views nurse as being similar to an important person in his/her life

U

Unconditional release – no restrictions upon release of the patient

V

Voluntary admission – admission of a patient to a psychiatric hospital or other inpatient unit at his or her own request

W

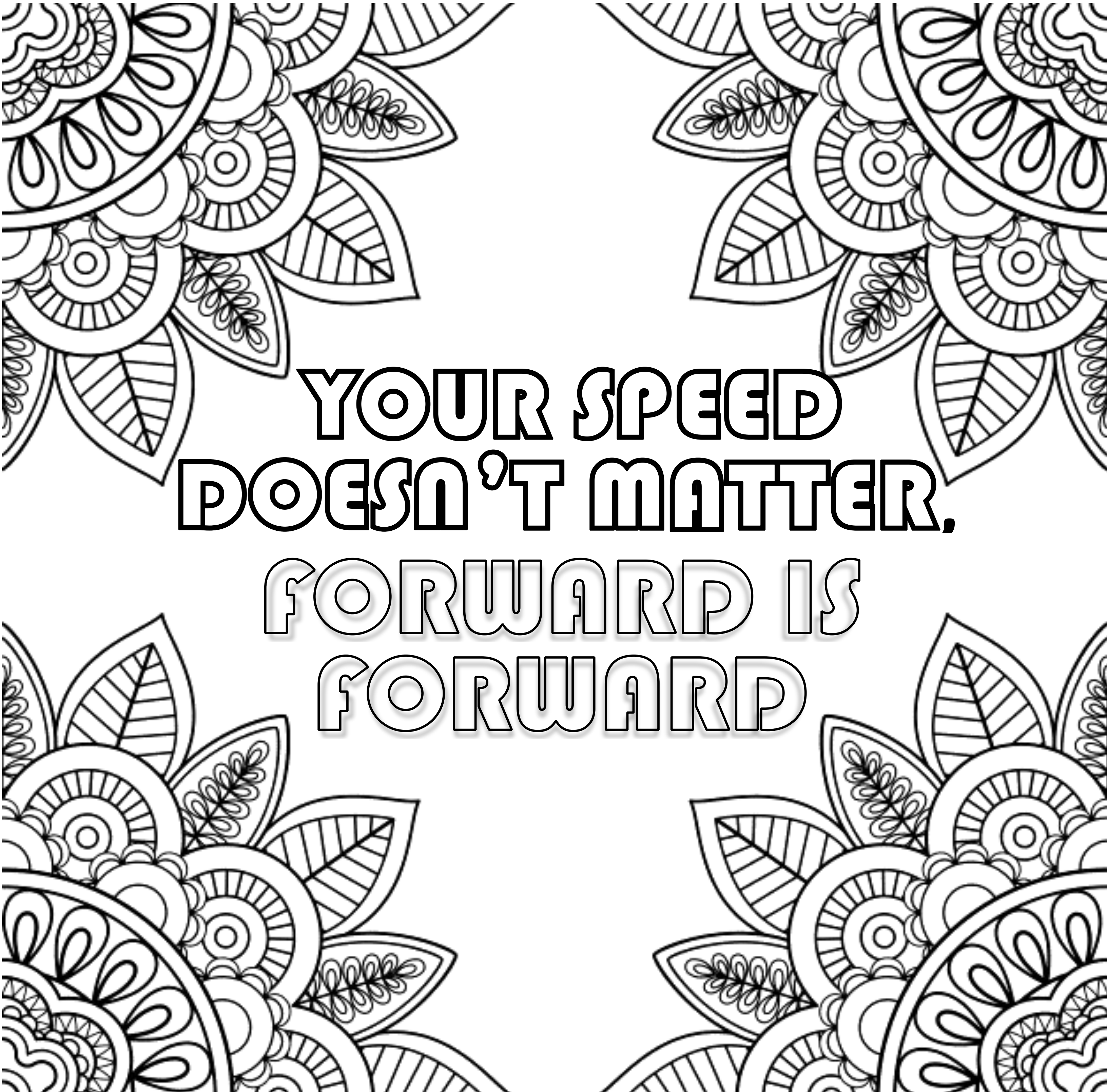
Waxy flexibility – a condition in which a patient's limbs retain any position that they are manipulated into; similar to catalepsy

Example: a doctor raises one of your arms and your arm stays in that position for a while

Word salad – a jumble of extremely incoherent speech characterized by random words or phrases linked together in an unintelligible manner

We continuously focus on caring for our patients' mental health and often forget to focus on our *own* mental health. I am *proud* of you for making it this far in your nursing journey. If you haven't done so already, it's time to take a moment to care for *your* mental health.

I have included a coloring page to take your mind off of studying, midterms, finals, clinical, or whatever is causing you stress right now. Use this as your self-care when you need it most.

Sincerely, RNExplained

COLOR ME IN!